

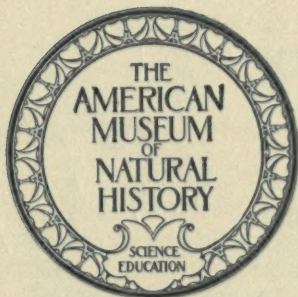
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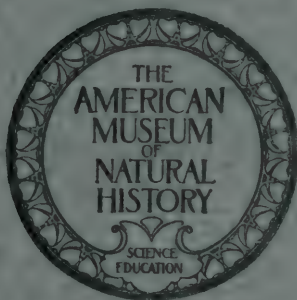
No. 55. Page 5, line 7 from bottom, read *bæops* for *bæops*.

AMERICAN MUSEUM NOVITATES

No. 37

HESPEROPITHECUS, THE FIRST ANTHROPOID PRIMATE FOUND IN AMERICA

BY HENRY FAIRFIELD OSBORN



Issued April 25, 1922

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Number 37

April 25, 1922

59.6.88H (1183:78.2)

HESPEROPITHECUS, THE FIRST ANTHROPOID PRIMATE FOUND IN AMERICA

By HENRY FAIRFIELD OSBORN

It is hard to believe that a single small water-worn tooth, 10.5 mm. by 11 mm. in crown diameter, can signalize the arrival of the anthropoid Primates in North America in Pliocene time. We have been eagerly anticipating some discovery of this kind, but were not prepared for such convincing evidence of the close faunal relationship between eastern Asia and western North America as is revealed by this diminutive specimen. The entire credit for the discovery belongs to Mr. Harold J. Cook, consulting geologist, of Agate, Nebraska, who has been contributing for many years to our knowledge of the extinct fauna of Nebraska through both his discoveries and his writings. He wrote to the present author (February 25, 1922):

I have had here, for some little time, a molar tooth from the Upper, or Hipparion phase of the Snake Creek beds, that very closely approaches the human type. It was found associated with the other typical fossils of the Snake Creek, and is mineralized in the same fashion as they are. I sent a brief description of this to Professor Loomis a short time before the Amherst meeting of this year, with a request that it be read at that time, if opportunity offered. The manuscript was returned to me here immediately after the meetings, but with no notation as to whether it was read or not, or presented at that time in any fashion.

Inasmuch as you are particularly interested in this problem and, in collaboration with Dr. Gregory and others, are in the best position of anyone to accurately determine the relationships of this tooth, if it can be done, I will be glad to send it on to you, should you care to examine and study it. Whatever it is, it is certainly a contemporary fossil of the Upper Snake Creek horizon, and it agrees far more closely with the anthropoid-human molar, than that of any other mammal known.

On receiving the tooth, the author telegraphed (March 14, 1922): "Tooth just arrived safely. Looks very promising. Will report immediately." A letter followed the same day:

The instant your package arrived, I sat down with the tooth, in my window, and I said to myself: "It looks one hundred per cent anthropoid." I then took the tooth into Doctor Matthew's room and we have been comparing it with all the books, all the casts and all the drawings, with the conclusion that it is the last right upper molar tooth of some higher Primate, but distinct from anything hitherto described. We await, however, Doctor Gregory's verdict tomorrow morning; he certainly has an eagle eye on Primate teeth. . . . We may cool down tomorrow, but it looks to me as if the *first anthropoid ape of America* had been found by the one man entitled to find it, namely, Harold J. Cook!

On March 22, 1922, the author wrote:

We believe we have found another one of the teeth, very much worn, of the same animal, which, so far as it goes, is confirmatory. The animal is certainly a new genus of anthropoid ape, probably an animal which wandered over here from Asia with the large south Asiatic element which has recently been discovered in our fauna by Merriam, Gidley and others. It is one of the greatest surprises in the history of American palaeontology and I am delighted that you are the man who found it. Our specimen is unrecognizable, it is so much worn.

The tooth arrived with the following label:

One Molar Tooth, ?Anthropoid, No. HC425, Collection of Harold J. Cook, Agate, Nebraska. Found in Upper Phase of Snake Creek Beds, Typical Locality, in position in gravels with other fossils.

Following the examination by Dr. William D. Matthew and the author, who determined the tooth as a second or third upper molar of the right side of a new genus and species of anthropoid, the tooth was submitted to Curator William K. Gregory and Dr. Milo Hellman, both of whom have made a special study of the collections of human and anthropoid teeth in the American Museum and the United States National Museum. They reported (March 23, 1922) as follows:

1. Such a degree of wear is very rarely seen on m^3 , and in view also of the marked difference in form of m^3 , we rather incline to the opinion that it is an m^2 . 2. The kind of wear shown in this tooth, which has an evenly concave surface (without humps representing the para- and metacones), has never been seen in an anthropoid tooth, and we are of the opinion that even in very old chimpanzees the outer half of the crown will be unevenly worn. 3. The nearest in point of wearing surface is the supposed m^2 attributed to *Pithecanthropus*, also in form of roots. The strong hypocone in "*Pithecanthropus*" and the absence of hypocone in the new specimen is not positively diagnostic, in view of the immense differences in the hypocone, both in apes and man. 4. On the whole, we think its nearest resemblances are with "*Pithecanthropus*" and with men rather than with apes.

On the basis of these very careful studies, the author decided to make this tooth the type of the following new genus and species.

***Hesperopithecus haroldcookii*,¹ new species**

This second upper molar tooth is very distant from the gorilla type, from the gibbon type, from the orang type; among existing anthropoid apes it is nearest to m^2 of the chimpanzee, but the resemblance is still very remote. It is excluded from close affinity to the fossil Asiatic anthropoid apes, such as *Dryopithecus punjabicus*, *Palaeopithecus siulensis*, and *Sivapithecus*, recently related to the human stem by Pilgrim. Its transverse diameter of 11 mm. is greater than its anteroposterior diameter of 10.5 mm. In the corresponding human tooth, m^2 , of an American Indian, with which it is compared in Fig. 2, the transverse diameter is 12.5 mm., the anteroposterior

¹The names signify an anthropoid of the Western World discovered by Mr. Harold J. Cook.

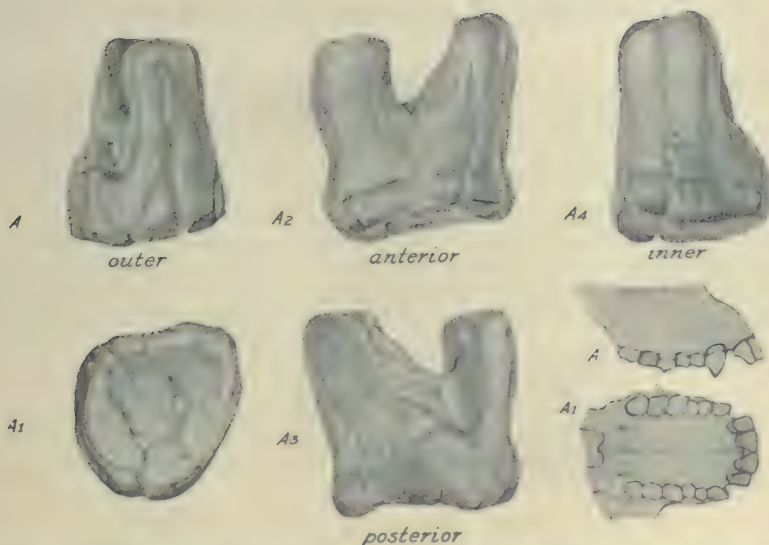


Fig. 1. Type of *Hesperopithecus haroldcookii*, No. HC425, Collection of Harold J. Cook, Agate, Nebraska. From the Snake Creek beds, Sioux County, Nebraska. After a drawing of the type tooth in five aspects by Mrs. L. M. Sterling. Enlarged to twice the natural size.
A, A₁ Palate of chimpanzee, m² shaded.

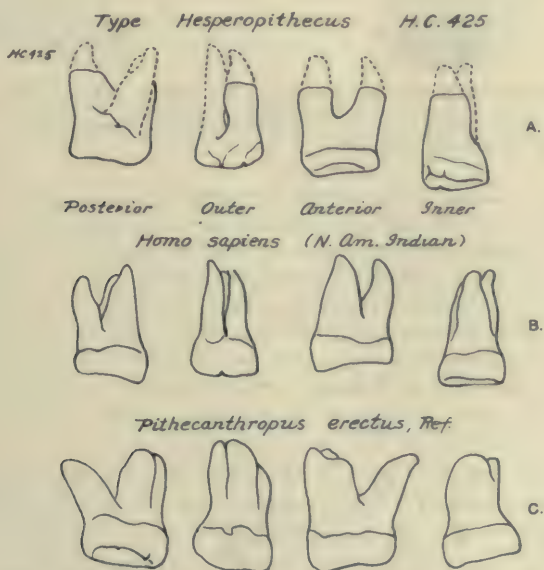


Fig. 2. Comparison of the superior molar teeth of *Hesperopithecus* type, of *Homo sapiens*, of *Pithecanthropus erectus* ref., to show the similar disposition of the inner and outer fangs. Teeth not drawn to the same scale.

diameter is 11 mm. Thus the proportions of the molar crown of the *Hesperopithecus* type are about the same as those in the *Homo sapiens mongoloideus* type. There is also a distant human resemblance in the molar pattern of *Hesperopithecus*, as very skilfully portrayed (Fig. 1) by the artist, Mrs. L. M. Sterling, to the low, basin-shaped, channeled crown in certain examples of *Homo sapiens*. But the *Hesperopithecus* molar cannot be said to resemble any known type of human molar very closely. The author agrees with Mr. Cook, with Doctor Hellman, and with Doctor Gregory, that it resembles the human type more closely than it does any known anthropoid ape type; consequently it would be misleading to speak of this *Hesperopithecus* at present as an anthropoid ape; it is a new and independent type of Primate and we



Fig. 3. Superior molar tooth from Snake Creek, Nebraska, Amer. Mus. No. 17736, Collection from Amer. Mus. Exped. of 1908. Found by William D. Matthew. Provisionally regarded as m^3 of *Hesperopithecus*. Species indeterminate. Enlarged to twice the natural size.

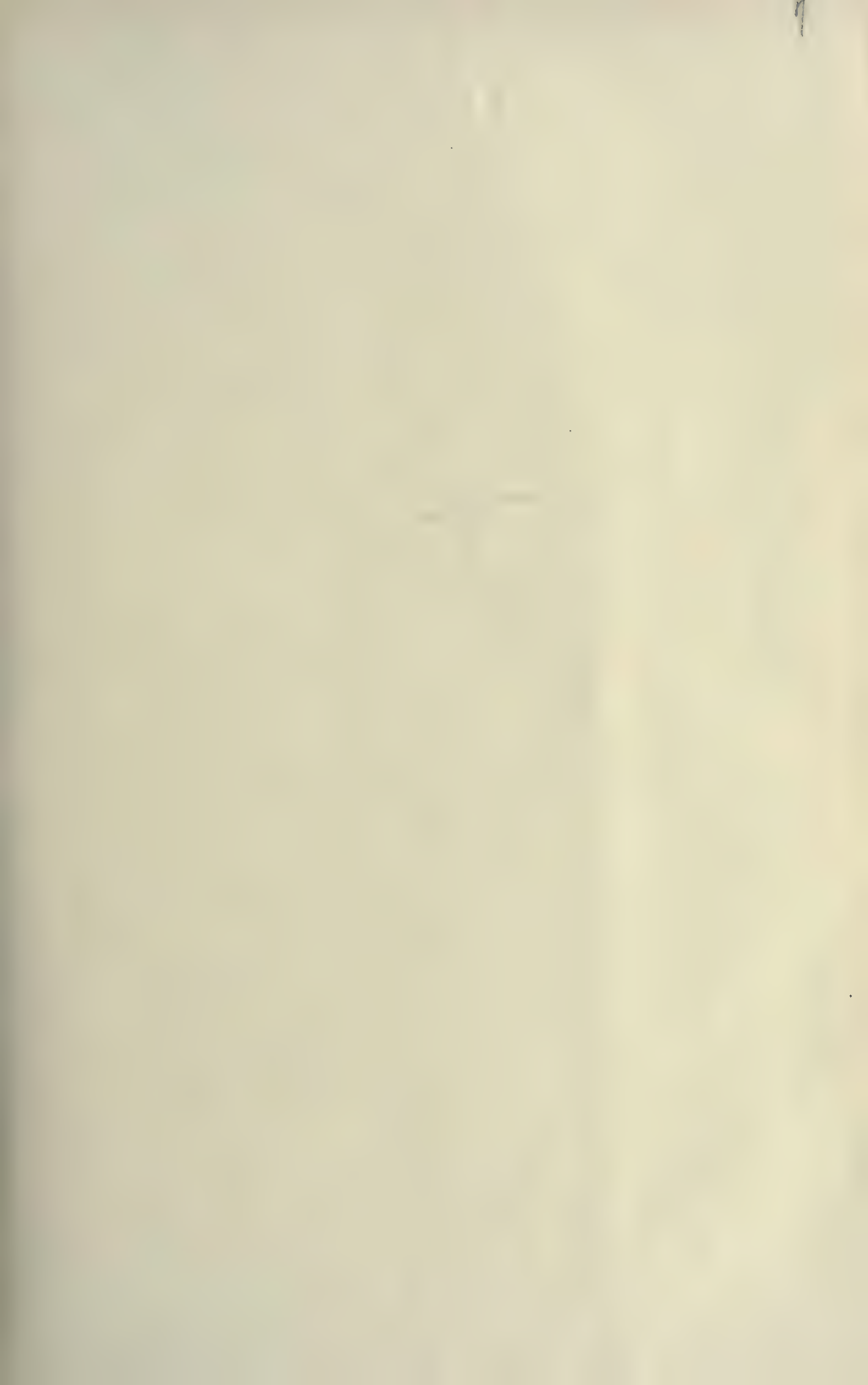
A, A₁ Palate of chimpanzee, m^3 shaded.

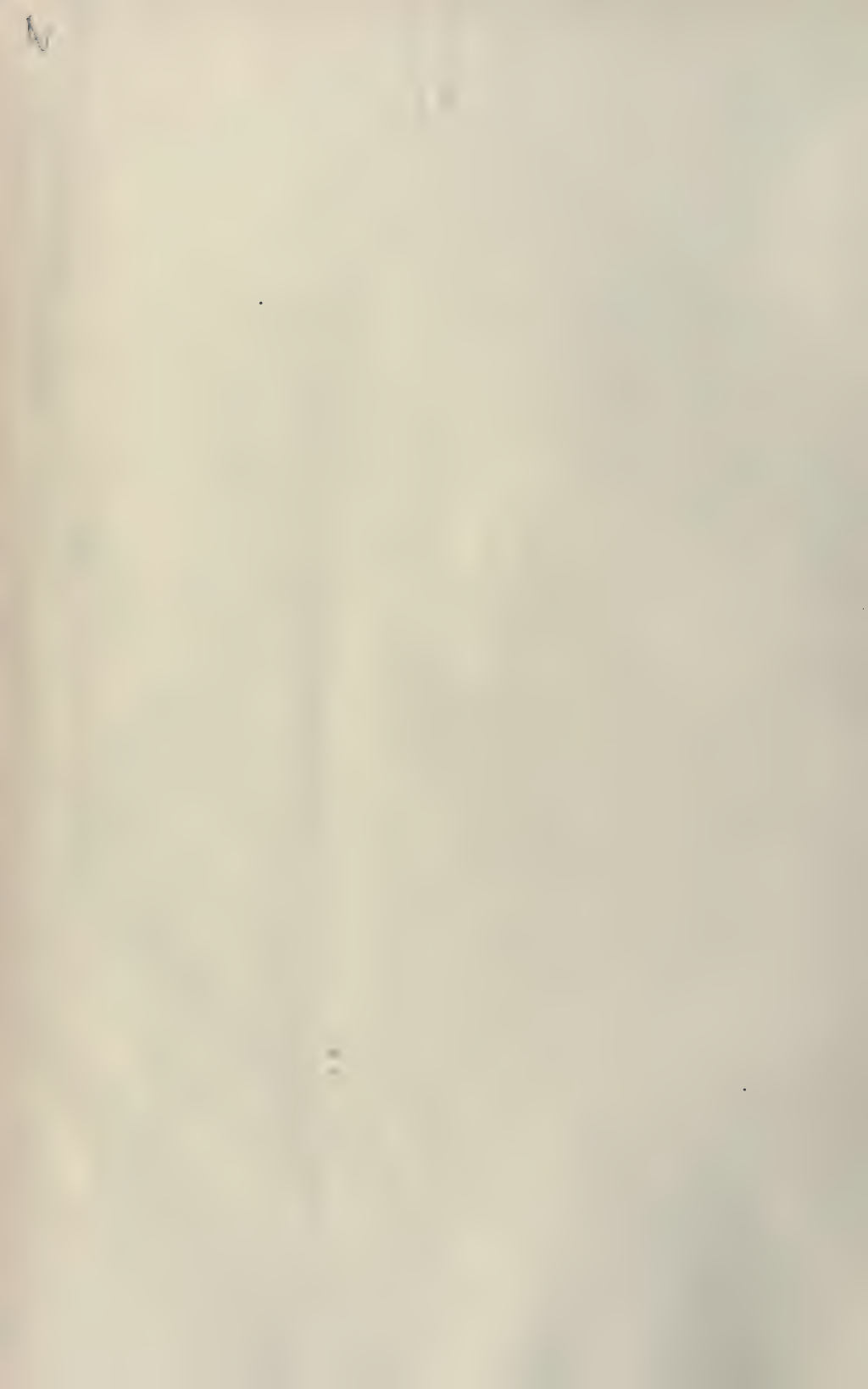
must seek more material before we can determine its relationships. It is certainly not closely related to *Pithecanthropus erectus* in the structure of the crown, for *Pithecanthropus* has a single, contracted crown in which the superior grinding surface has a limited crenulated basin, whereas *Hesperopithecus* has a widely open crown with broadly channeled or furrowed margins, and a postero-internal crest suggesting the hypocone of a higher Primate form. The disposition of the roots in *Hesperopithecus*, in *Homo*, in *Pithecanthropus*, is shown to be very broadly similar in comparative Fig. 2. The *Hesperopithecus* molar is three-fanged, the postero-external fang having been broken off in the type; the internal fang shows a median internal groove and a tendency to a deep external groove on the outer side.

Since 1908 there has been in the American Museum collection from this same horizon another small water-worn tooth, discovered by Dr. William D. Matthew. The specimen belonged to an aged animal and is so water-worn that Doctor Matthew, while inclined to regard it as a Primate, did not venture to describe it. It now appears, from close comparison with the type of *Hesperopithecus*, to be closely related generically, even if it is not related specifically. The greatly enlarged drawing

(Fig. 3), reproduced to the same scale as that of the type above described, shows that the molar pattern is fundamentally similar. The crown differs in its much more triangular form and, were it not for its extremely worn surface, we should unhesitatingly pronounce it as a third superior molar; it has, therefore, been given this position provisionally in the diagram; it seems to confirm the opinion of Gregory and Hellman that the type of *Hesperopithecus* is a second superior molar.

The geologic age of these two specimens is now believed to be the same as that of Thousand Creek, Nevada, and Rattlesnake, Oregon, among the fauna of which *Pliohippus* is very abundant and varied; it also contains *Ilingoceras* and other strepsicerine antelopes of Asiatic affinity; it is the last American fauna in which occurred the rhinoceros, preceding the Blanco fauna in which the Asiatic brevirostrine *M. mirificus* first occurs.



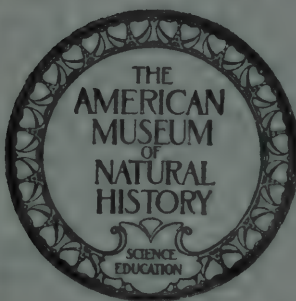


AMERICAN MUSEUM NOVITATES

No. 38

DESCRIPTION OF A NEW LOACH FROM NORTH-EASTERN CHINA

BY HENRY W. FOWLER



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Number 38

May 25, 1922

59.7, 55L (51.1)

DESCRIPTION OF A NEW LOACH FROM NORTH-EASTERN CHINA

BY HENRY W. FOWLER

Lefua andrewsi,¹ new species

Head $4\frac{1}{2}$; depth 7; D. II, 6; A. II, 6; P. I, 12; V. I, 6; scales about 104 in a median lateral series; head width about $1\frac{3}{4}$ in its length; head depth 2; snout $3\frac{1}{3}$; eye $4\frac{1}{8}$; maxillary $3\frac{1}{4}$; interorbital $3\frac{1}{10}$; depressed dorsal $1\frac{1}{4}$; depressed anal $1\frac{3}{8}$; least depth of caudal peduncle 2; caudal length $1\frac{1}{10}$; pectoral $1\frac{1}{8}$; ventral $1\frac{1}{4}$.

Body elongate, moderately slender, considerably depressed forward and becoming compressed posteriorly, edges all convex except slight keel forward above and below on caudal peduncle by rudimentary caudal rays to caudal base. Caudal peduncle strongly compressed, least depth little less than its length.

Head moderate, robust, broadly depressed, especially behind. Snout broad, obtuse, length $\frac{3}{4}$ its width. Eye small, hind edge about midway in head length. Maxillary small, about half-way to eye. Jaws even. Lips rather thin. Nasal barbel reaches eye center. Maxillary barbel to hind eye edge. Upper lateral barbel to eye center. Interorbital broadly though slightly convex.

Gill-opening lateral, long as snout.

Scales all small, not overlapping, in rather irregular distribution though close-set and with imbedded appearance; marginal radiating striæ 31 to 37; circuli moderately fine. No developed lateral line.

Dorsal origin little nearer that of pectoral than to caudal base, depressed fin slightly less than caudal base. Anal inserted little behind dorsal base, though little before depressed dorsal tip, depressed fin three-fourths to caudal base. Caudal rounded, median rays longest. Pectoral about half-way to ventral. Ventral reaches about three-fourths to anal. Vent close before anal.

Color in alcohol nearly sepia above, dusted very obscurely with darker. Dusky lateral band, rather obscurely defined, from each side of snout tip to eye, though below and over infraorbitals, back to caudal base. Posteriorly band much darker to blackish. Dark vertebral line on predorsal, slightly so behind dorsal. Barbel edges and lip margins dusky. Iris pale slaty. Dorsal and caudal grayish, both finely and obscurely spotted with dull dusky, only a distinct median black blotch on latter, reflected out on median rays basally. Other fins all pale, pectorals with few shadings.

Length, 52 mm.

Type, No. 7974, American Museum of Natural History. Shing Lung Shan, Eastern Tombs, China. August 7, 1921. Collected by The Third Asiatic Expedition of The American Museum of Natural History.

¹In recognition of Mr. Roy Chapman Andrews, leader of the Third Asiatic Expedition of The American Museum of Natural History.

This species is closely related to *Lefua costata* (Kessler) and appears to differ only in the color-pattern. Apparently the two forms occur associated, as they were received in the same lot. In *Lefua andrewsi* the broad and well-defined lateral band of dusky to blackish, which is reflected out on the median caudal rays, is diagnostic. In *Lefua costata* the scarcely evident lateral streak is replaced at the caudal base by a definite small rounded black spot, clearly defined and not reflected out on the median fin-rays.



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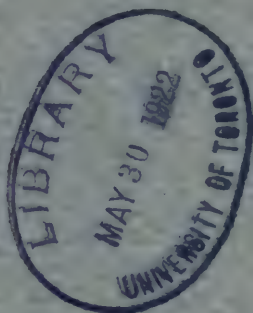
No. 39

TWO NEW GENERA OF NORTH AMERICAN BLOOD FLUKES

BY HORACE W. STUNKARD



Issued May 25, 1922



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59.51, 22S (7)

TWO NEW GENERA OF NORTH AMERICAN BLOOD FLUKES¹

BY HORACE W. STUNKARD

For a long time the writer has been engaged in a study of the blood flukes of North American turtles. An extended description of these forms is nearing completion but, since the publication of the longer paper may be delayed, the discovery of two new trematodes found in the vascular system of the snapping turtle *Chelydra serpentina* is announced at this time. These blood flukes are so unlike all previously described forms that they can not be assigned to any existing genera and differ so much from each other that they can not be included in the same genus.

SPIRORCHIDÆ

The family Spirorchidæ has the following characteristics.

Slender blood-inhabiting trematodes, with slightly developed musculature and one or two weak suckers. Pharynx absent. Testes lobed, multiple, anterior and sometimes also posterior to the ovarian complex. Ovary lobed; Laurer's canal present; uterus short. Eggs large, thick-shelled, discharged singly.

HAPALOTREMINÆ

The subfamily Hapalotremiæ is characterized as follows.

Hermaphroditic, blood-inhabiting distomes. Esophagus often with dilated portion or portions, without a pharynx, and surrounded by secretive cells. Ceca end blindly near the posterior end of the body. Excretory vesicle branches behind the posterior testes. Ovary and oötype situated near the middle of the body and between the testes; genital pore dorsal and sinistral near the level of the ovary; vitellaria numerous, both lateral and medial to the ceca throughout most of their course; Laurer's canal present; uterus short containing a single egg which bears either filaments or processes.

HAPALORHYNCHUS, new genus

This genus is characterized by the presence of a protruding oral sucker; acetabulum situated near the posterior end of the anterior third of the body; terminal excretory pore and short median excretory vesicle; testes separated by the ovary; large seminal vesicle and prostate gland anterior to the testes; dorsal genital pore located near the middle of the body and slightly left of the median line; vitellaria extensively developed in front of the acetabulum and behind the ovary; small seminal receptacle and Laurer's canal; and also by the absence of a pharynx, cirrus sac and cirrus.

¹Contribution from the Biological Laboratory, New York University.

***Hapalorhynchus gracilis*, new species**

Figures 1 and 2

The material upon which this description is based consists of over one hundred individuals collected from the washings of the visceral organs, lungs, liver, kidneys, mesenteries, and alimentary tract of turtles from North Judson, Indiana.

Fixed and mounted specimens measure from 1.5 to 1.9 mm. in length and from 0.15 to 0.23 mm. in width. Living specimens in an extended condition are slightly longer and more slender. The worms are fusiform in shape tapering anteriorly and posteriorly in a similar manner. The region of greatest width is near the middle of the body where the reproductive organs are located. Before and behind the limits of the vitellaria the body narrows considerably. In cross-section the body is oval, flattened ventrally.

The cuticula is thin and unarmed. The musculature is weak and poorly developed.

The acetabulum is slightly protrusible but not stalked and is situated near the posterior end of the anterior third of the body. It is cup-shaped, normally circular in outline but sometimes elongated or flattened as a result of pressure or contraction. It measures from 0.061 to 0.069 mm. in diameter and its depth is approximately equal to its diameter.

The oral sucker is slightly subterminal and capable of considerable extension and retraction. In fixed and mounted specimens, usually about one-half of the sucker protrudes from the body. In shape it is ovate, wider anteriorly and measures from 0.073 to 0.084 mm. in length and from 0.054 and 0.058 mm. in extreme width. The esophagus extends posteriorly from the oral sucker to the bifurcation of the alimentary tract midway between the oral and ventral suckers. It is straight in extended specimens, often with two or three dilated portions. The lining is cuticular and it is surrounded by secretive cells. No pharynx is present. The digestive ceca meet anteriorly to form an angle and end blindly about one-fifth of the body length from the posterior end. They are somewhat dorsal in position and the left crux is flexed median and dorsad near the middle of the body, passing on the median side of the genital pore.

The excretory pore is located at the posterior end of the body and a large median collecting vesicle passes forward dividing a short distance behind the intestinal crura to form two lateral collecting ducts.

The testes are situated one behind and the other before the ovary. The posterior testis is the larger; it has an elongated oval form and measures 0.18 to 0.21 mm. in length, 0.05 to 0.06 mm. in width and 0.06 to 0.07 mm. in depth. The anterior testis is situated obliquely, immediately in front and slightly at the right of the ovary. It is ovate to triangular in outline, the widest portion is anterior and median and the organ narrows laterally and posteriorly. The posterior end occupies the right side of the body at the ovarian level. Its long axis measures from 0.064 to 0.084 mm. and its transverse axis 0.04 to 0.05 mm.

There is a large seminal vesicle which extends from the level of the acetabulum about one-half of the distance posteriorly to the ovary. On the right side it has an indentation and is partially covered by a lobe of the vitellaria. From the median

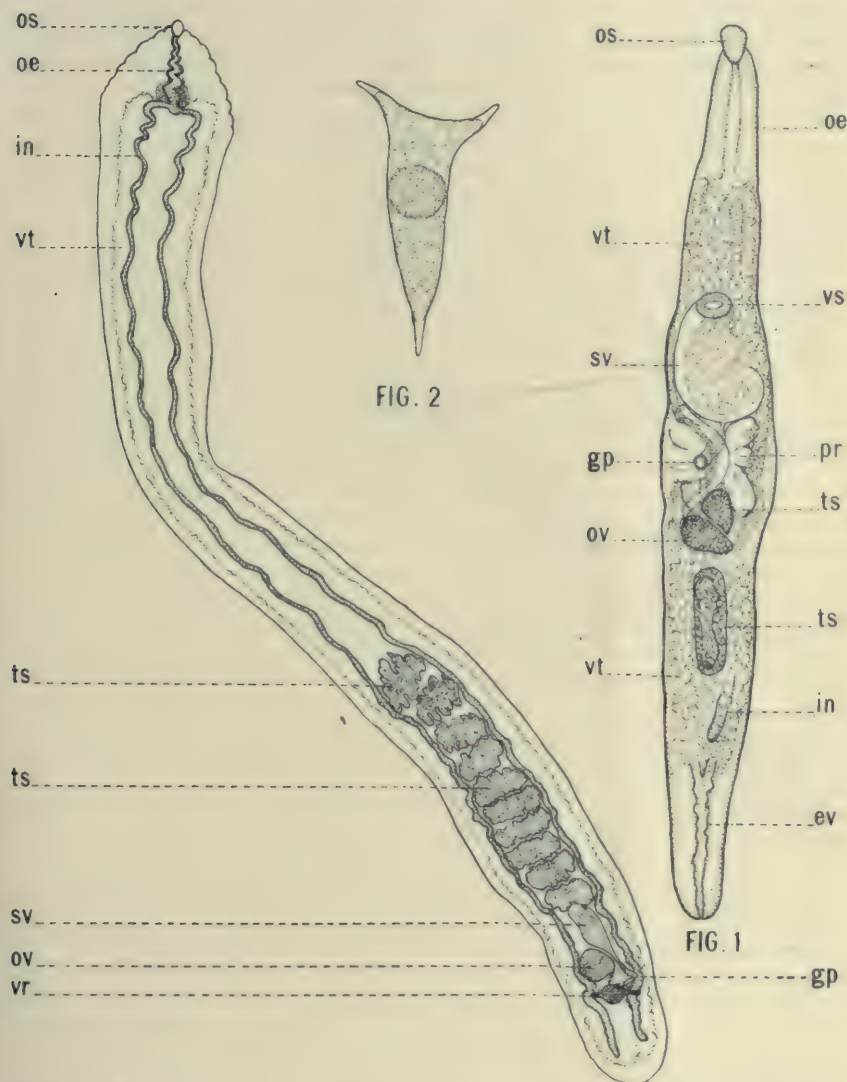


FIG. 2

FIG. 1

FIG. 3

Fig. 1. *Hapalorhynchus gracilis*, dorsal view. *Ev*, excretory vesicle; *gp*, genital pore; *in*, intestine; *oe*, esophagus; *os*, oral sucker; *ov*, ovary; *pr*, prostate; *sv*, seminal vesicle; *ts*, testis; *vr*, vitelline receptacle; *vs*, acetabulum; *vt*, vitellaria.

Fig. 2. Egg of *Hapalorhynchus gracilis*.

Fig. 3. *Henotosoma haematobium*, ventral view. Abbreviations as for *Hapalorhynchus gracilis*.

posterior margin of the vesicle the vas deferens emerges as a small tube. It enlarges almost immediately and passes posteriad, dorsad and sinistrad to the genital pore. The anterior part is often filled with spermatozoa while the terminal part is usually empty. This terminal part is lined with cuticula and contracts to a small duct which opens to the surface just median and anterior to the opening of the uterus. The pore is double, the male and female canals opening separately although the wall separating them is very thin and they appear to discharge through a common orifice. A cirrus sac and cirrus are lacking. The vas deferens and the terminal part of the seminal vesicle are enclosed in a large prostate gland which occupies most of the body space between the anterior testis and the seminal vesicle.

The ovary is situated slightly at the left of the median line and posterior to the middle of the body. Its long axis is almost at right angles to the long axis of the worm. It measures from 0.1 to 0.12 mm. in length and from 0.06 to 0.08 mm. in extreme width. It is ovoid to pyriform in shape, the wider end is lateral and slightly anterior, and the oviduct arises at the median posterior margin. The oviduct passes posteriad almost to the level of the posterior testis. Here it gives off a small seminal receptacle and Laurer's canal passes dorsally opening to the surface near the median line. Immediately following the origin of Laurer's canal, the vitelline duct discharges into the oötype and the canal then passes forward on the dorsal side of the body and leads directly to the genital pore. The vitellaria consist of masses of follicles extending on either side of the body from the bifurcation of the alimentary tract to the bifurcation of the excretory vesicle. They extend to the median line forming a solid mass in front of the acetabulum and behind the ovary except for a small area where the posterior testis occupying almost all the space between dorsal and ventral walls of the body limits their presence. Between the acetabulum and the ovary they are restricted to narrow tracts at the sides of the body lateral to the intestinal diverticula.

The genital pore is dorsal in position, situated near the middle of the body, slightly at the left of the median line. The diverticulum of the intestine and the vitelline tube of that side are bent mediad at the level of the pore, and lie median to it. This condition suggests strongly that the genital pore has migrated from a ventrolateral or lateral to a dorsal position pushing the intestinal and vitelline structures before it.

The uterus is short and in only one out of many individuals examined has an egg been found in the body. Considering the size of the egg it appears certain that not more than a single egg can be present in the uterus at one time. The egg (Fig. 2) is tricornuate, the shell is thick and resistant to pressure although almost colorless. In the body the egg lies in the uterus with the single horn forward and the forward tip is often bent or slightly coiled. The eggs reach the outside world with the feces of the host and are often present in large numbers. Eggs in the feces measured 0.27 mm. in length, 0.07 mm. in width at the level of the embryo and 0.2 mm. between the tips of the posterior horns.

Holotype. — No. 125, Dept. Lower Invertebrates, Amer. Mus. Nat. Hist.

SPIRORCHINÆ

The subfamily *Spirorchinæ* is characterized as follows.

Hermaphroditic blood inhabiting monostomes with small oral sucker. Esophagus without pharynx and surrounded by secretive cells which are more numerous near its posterior end. Ceca end blindly near posterior end of body; excretory

vesicle small, dividing almost immediately into lateral collecting ducts. Testes numerous (usually ten) arranged in a linear series in the intercecal area anterior to the ovary; cirrus sac small; ovary dextral in position between the testes and the genital pore; seminal receptacle and Laurer's canal present; vitellaria both extra and intercecal; genital pore ventral, sinistral, near the posterior end of body; uterus short, containing a single oval egg.

Henotosoma, new genus

This genus is characterized by the small oral sucker and relatively short esophagus; absence of pharynx; terminal excretory pore and excretory vesicle which divides almost immediately to form lateral collecting ducts; testes usually ten in number, irregularly lobate or sinuate, arranged in linear series anterior to the ovary but situated in the posterior half of the worm; seminal vesicle posterior to the testes with only the terminal part of the vas deferens enclosed in a small cirrus sac; genital pore ventral, sinistral, near the posterior end of the body; vitellaria numerous, extending from the bifurcation of the alimentary tract almost to the posterior end of the body; ovary oval, lobed, on the right side of the body; small seminal vesicle and Laurer's canal. The uterus is short and contains a single oval egg.

Henotosoma hæmatobium, new species

Figure 3

The first specimen of this form was found December 1, 1914, in the lung of a large turtle collected near Raleigh, North Carolina. In the fall of 1916, six specimens were removed from the left subclavian artery of another turtle from the same locality. Since that time other specimens have been removed from the heart and larger arteries of turtles collected in New York and New Jersey. In November, 1921, a shipment of turtles was received from North Judson, Indiana, seventy-five per cent of which harbored the parasite. Records of dissection show one turtle in which twelve specimens were found in the lungs, four in the pulmonary arteries, two in each auricle, sixteen in the ventricle, eight in the mesenteric arteries and twenty eight at the posterior end of the aorta. Where several worms were found together, they were often entangled and very hard to separate. Those found in the ventricle frequently were partially embedded in the muscular wall.

These worms are elongate, flattened trematodes with almost parallel sides, rounded posterior and pointed anterior ends. The anterior end in extended condition narrows uniformly to the tip and when contracted becomes broad and blunt with crenated margins. Extended individuals are widest in the region occupied by the testes and have a narrow zone in the central part of the body. On contraction, the body anterior to the testes becomes approximately the width at their level. Living worms may extend to a length of 12.5 mm. and contract to less than 6 mm. Fixed and mounted specimens measure from 5 to 9 mm. in length and from 0.48 to 0.75 mm. in width. The width is from two to three times the dorso-ventral measurement.

The cuticula is thin and smooth, lacking spines or other modifications. The musculature is light and delicate.

The oral sucker is the only organ of attachment. It is situated at the anterior tip and in extended specimens slightly protrudes from the body. It is ovoid in shape, wider anteriorly and measures from 0.077 to 0.1 mm. in length and from 0.071 to 0.084 mm. in width. The mouth opening is subterminal. Depending on the amount of contraction in the anterior region of the body, the esophagus is slightly or exceedingly sinuous, the sinuosity varying with the extent of contraction. In length it measures from 0.39 to 0.77 mm. It increases in diameter posteriorly although the size of the lumen is not uniform, frequently having one or more dilated portions. The lining is cuticular and throughout its length the esophagus is surrounded by secretive cells. At the posterior end for about one-fifth of its length the gland cells become more numerous forming a conspicuous enlarged portion. No pharynx is present. The intestinal diverticula arise just before the posterior end of the esophagus and pass laterad about one-half of the distance to the body wall where they turn sharply posteriad and extend almost to the end of the body. Their course is notably sinuous and they are spread farther apart in the region occupied by the reproductive organs, passing lateral to the testes and ovary. They have an almost uniform diameter and are filled with decomposing blood which gives them a black appearance.

The excretory pore is situated at the posterior end of the body and the vesicle divides almost immediately to form two lateral collecting ducts which pass anteriorly.

The reproductive organs resemble in many respects those of *Spirorchis*. The testes number ten in mature individuals although after a time certain testes degenerate. They are arranged one before the other in the intercecal area in the posterior half of the body. The most anterior testis is about three-fifths of the body length from the anterior end and the posterior testis is separated from the posterior end of the body by slightly less than one-half the distance between the anterior and posterior testes. The testes are irregularly lobed, contiguous structures. In the anterior testes the lobes are deep and the testes are distinctly separated, while in the middle of the group the lobulations are smaller, less conspicuous, and the organs closer together. The testes are flattened antero-posteriorly, and this is particularly noticeable at the center of the group where the pressure is greatest. In the testicular area they occupy practically all the space between the ceca but do not extend laterally beyond the intestinal diverticula. Because of their shape it is difficult to make satisfactory measurements of the testes but they vary in size from 0.12 by 0.27 mm. to 0.27 mm. by 0.43 mm. The posterior testis opens directly into a large ovoid or pyriform seminal vesicle. The broader end is anterior and the posterior end tapers to a duct which passes on the left side of the body and near the mid-ovarian level enters the cirrus sac. The cirrus sac is small and the muscular wall slightly developed. It is pyriform in shape, wider anteriorly, and the prostate if present is represented by only a few cells. The cirrus sac varies in length from 0.154 to 0.22 mm. and in width from 0.05 to 0.077 mm. The genital pore is ventral, just posterior to the level of the ovary, and situated beneath the cecum of the left side. The opening of the cirrus is anterior to that of the uterus.

The ovary is a lobed oval structure situated on the right side of the body between the seminal vesicle and the genital pore. It measures from 0.154 by 0.22 mm. to 0.23 by 28 mm. The oviduct arises at the median posterior margin and passes dextrad and posteriad. After continuing a short distance it turns mediad where Laurer's

canal is given off and the common vitelline duct is received. The oötype region is short and the tube then passes forward, laterad and ventrad to the genital pore. The vitellaria are extensively developed and consist of masses of follicles extending from the bifurcation of the alimentary tract almost to the posterior end of the body. They are not separated into lobes but form a continuous sheet of cells extending on the lateral side of the crura throughout their length and filling the intercecal area anterior to the testes and posterior to the vitelline receptacle. Just behind the level of the genital pore vitelline ducts pass mediad on the ventral side of the body and unite to form a large reservoir, the vitelline receptacle, which opens into the oötype through the common vitelline duct.

The uterine portion of the female canal is short and contains a single oval egg. A metraterm is present although not strongly developed. The eggs are thick shelled, brown in color and are discharged into the blood vessels. The smallest egg measured in the uterus was 0.77 mm. in length and 0.06 mm. in width, the largest 0.086 mm. in length and 0.065 mm. in width. Eggs in the tissue of the host and found in the feces have an average measurement of 0.115 mm. in length and 0.081 mm. in width. The eggs increase in size after deposition and usually become darker in color. They are provided with a cap which opens to allow the escape of the embryo.

Holotype.—No. 126, Dept. Lower Invertebrates, Amer. Mus. Nat. Hist.

In the abstracts of papers presented at the annual meeting of the American Association for the Advancement of Science, December 28-30, 1921 and published in the January number of the Journal of Anatomy, G. A. MacCallum reported the discovery of trematodes in the heart of *Chelydra serpentina*. He says: "On July 17, 1921, I found within the heart of a *Chelydra serpentina* (western form) five Spirorechidæ which were attached to the walls of the ventricle, but all coiled together as if in coition. These worms were the largest of any Spirorechidæ I had seen, being in length 8.50 to 9 mm. \times 1 mm. wide, and which I have named *S. chelydræ*. The peculiarity about these worms is the much bent esophagus, also the numerous glands at the junction of the esophagus and ceca and possibly posterior also on the outside of the esophagus to the mouth." The statement of MacCallum is so brief and indefinite that it is hardly possible to recognize a species from his description. The last sentence would indicate that the mouth is posterior, which certainly is not the case. The only data upon which a determination from his description could be based are size and location in the host. The course of the esophagus is dependent upon the amount of extension or contraction in the anterior part of the body and the esophageal glands mentioned are characteristic of blood flukes in general. Consequently these features can not serve as specific criteria.

It seemed barely possible that the species reported by MacCallum might be the same as the larger of the forms here described, and to avoid error on this point I wrote Dr. MacCallum asking for a loan of his

material. Although his final description had not as yet been published he kindly loaned material for examination and comparison. The specimens examined manifest the features designated as characteristics of the new genus *Henotosoma* and should, I believe, be assigned to that genus. They are not, however, in my opinion specifically identical with *H. hæmatobium* and their completed description will be made by Dr. MacCallum.

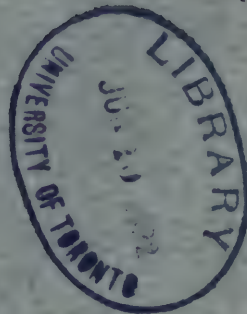
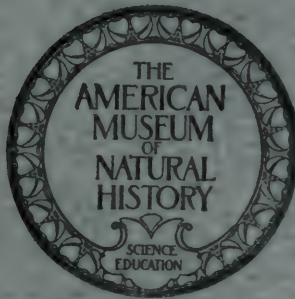
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NOTES ON SOME WESTERN BEES

By T. D. A. COCKERELL



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NOTES ON SOME WESTERN BEES

By T. D. A. COCKERELL

The bees upon which the following notes are based were collected by the American Museum expeditions to Arizona and the Rocky Mountains. Except where otherwise stated, they were collected by Frank E. Lutz and the field notes are by him.

DIANDRENA Cockerell

This genus (or subgenus of *Andrena*) was founded on those bluish or greenish species which possess only two submarginal cells, the *Panurgus chalybæus* of Cresson being the type. Viereck has (1917) described species in *Parandrena*, but this group appears to have been derived quite independently from the *Andrena* stem. As we now know it, *Diandrena* consists of a considerable number of rather closely related species, having its center in California, with a general distribution very like that of the mariposa lilies (*Calochortus*). The following species are Californian: *chalybæa* (Cresson), *puthua* Cockerell, *beatula* Cockerell, *cyanosoma* Cockerell, *clariventris* Cockerell, *scintilla* Cockerell, *foxii* (Cockerell), *austrocalifornica* (Viereck), *olivacea* (Viereck), *subchalybea* (Viereck), *submæsta* (Viereck), and *parachalybea* (Viereck). The only known species which are not Californian are *nothocalaidis* Cockerell from Colorado, *chalyboides* (Viereck) from Oregon, *perchalybea*¹ (Viereck) from Washington State, and the following new one from Wyoming.

Diandrena ablegata new species

♀.—Length about 9.5 mm. Blue-green, varying to olive-green, with a dull and granular surface. The type has the abdomen olive-green, with the hind margins of the third and fourth segments very broadly steel-blue and the first two segments suffused with the same color apically. Process of labrum strongly emarginate. Mandibles dusky reddish apically. Clypeus closely and finely punctured. Third antennal joint a little shorter than the next three together; apical half of flagellum marked with clear yellowish-ferruginous beneath. Facial foveæ black, very short and narrow, not going below antennal line; face with thin, pale hair in middle and black at sides; cheeks with white hair. Mesothorax and scutellum dull; thorax with pale fulvous-tinted hair, very thin above; a little dark hair sometimes present about the middle of the mesopleura. Tegulae shining black. Wings as in *D. nothocalaidis*, slightly

¹The name "*perchalybia*" in 1916, Proc. Acad. Nat. Sci. Phila., LXVIII, p. 591, is a misprint, as is shown by the references on p. 590 with the correct spelling.

dusky; stigma clear ferruginous. Legs with pale hair; scopa of hind legs abundantly pale fulvous, the tibiae posteriorly toward base with dark fuscous hair. Second abdominal segment depressed about one-third. Hair at apex of abdomen very pale fulvous, becoming fuscous at tip.

Wyoming: 7 ♀, Stewart Ranger Station (type locality) in Jackson Hole, about 6700 ft. alt., among lodgepole pine, Engelmann spruce, etc., July 18, 1920; 4 ♀ (one with deep orange pollen), Jackson, about 6300 ft. alt., moderately moist pasture-land, July 13-17, 1920.

This is so near to *D. nothocalaidis*, which flies in May, that I wondered whether it could be a pale-haired second brood of that species. Against this is the fact that *D. nothocalaidis* is very common at Boulder, Colorado, and we have never found any sign of a second generation or any other form of *Diandrena* there. *D. nothocalaidis* has the hair of face abundant and black, of pleura black, etc.

HALICTOIDES Nylander

The genus *Halictoides* was founded by Nylander in 1848 on two black European bees, of which *H. dentiventris* Nylander has been designated the type. No additions have been made to this immediate group; but Morawitz has described six species forming a series of *Halictoides* in which the body or head is more or less blue-green or blue-black and the legs of the males of the three species in which that sex is known are modified. Of these later species, *H. paradoxus* lives at high altitudes in the European Alps, *H. abocæruleus* and *H. pamirensis* occur in Turkestan; *H. calcaratus* and *H. montanus* are from China; and *H. clavicrus* is Mongolian. By the structure of the mouth-parts, *H. paradoxus* is nearer to some of the American species than to *H. dentiventris* (See *Annals and Mag. Nat. Hist.*, (7) IV, 1899, p. 420).

In America the genus is more numerously represented with over a dozen species. A table was given in 1916, *Ent. News*, XXVII, p. 62. In the same year Crawford described *H. viridescens* from California. California, with five species, and New Mexico, with six, indicate that the genus is best represented in the Southwest. One species, *H. norwængliæ* Robertson, occurs in the Northeastern States and one, *H. marginatus* Cresson, is found in the Central States from Illinois, whence Robertson described it as *autumnalis*, westward to the Rocky Mountains.

Five species were taken by the American Museum expeditions as follows.

Halictoides oryx Viereck

COLORADO: 1 ♀, Aspen, about 7000 ft. alt., at edge of town, July 24, 1919, collected by Herbert F. Schwarz.

***Halictoides mülleri* Cockerell**

WYOMING: 1 ♂, Stewart Ranger Station in Jackson Hole, about 6700 ft. alt., among lodgepole pine, Engelmann spruce, etc., July 18, 1920.

This is a most astonishing record, *H. mülleri* being a species of southern California (Pasadena and Claremont). There is no question about the identification.

***Halictoides harveyi* Cockerell**

COLORADO: 5 ♂, 1 ♀, about 10,000 ft. alt. on Summit Road near Ouray, July 13, 1919, collected by Messrs. Lutz, Schwarz, and Bailey; 1 ♂, Ouray, about 8000 ft. alt., at *Achillea millefolium*, July 11, 1919; 2 ♂, 4 ♀, Tennessee Pass, about 10,300 ft. alt., August 1, 1919, and 1 ♀ collected by Mrs. F. E. Lutz at about 10,500 ft. alt., August 8, 1920; 1 ♀, Leadville, about 10,200 ft. alt., August 3, 1919; 1 ♂, Pagosa Springs, about 7400 ft. alt., in the U. S. Forest Reservation, June 22, 1919.

***Halictoides (Parahalictoides) maurus* (Cresson)**

IDAHO: 1 ♀, Victor, about 6300 ft. alt., July 11, 1920. WYOMING: 1 ♂, Thumb of Yellowstone Lake, about 7800 ft. alt., July 9, 1920; 1 ♂, Stewart Ranger Station in Jackson Hole, about 6700 ft. alt., July 18, 1920; 1 ♂, along Cache Creek near Jackson, about 6600 ft. alt., July 14, 1920. COLORADO: at about 10,000 ft. alt., along Summit Road near Ouray, July 13, 1919, collected by Herbert F. Schwarz.

From Jackson, Wyoming, also comes a specimen of *Colletes nigrifrons* Titus, superficially exactly like *H. maurus*. Whether this resemblance has any biological significance I do not know. The *Colletes* was not found with the *H. maurus* but higher up at about 7000 ft. alt.

***Halictoides (Epihalictoides) marginatus* (Cresson)**

COLORADO: 49 ♂, 5 ♀, Wray, about 3700 ft. alt., August 17-19, 1919, both sexes but especially males at *Helianthus*, collected by Messrs. Lutz and Bailey; 1 ♂, La Junta, about 4100 ft. alt., August 12, 1920; 5 ♂, Boulder, about 5300 ft. alt., on plains, August 7-12, 1919; 1 ♀, about 8200 ft. alt., along Castle Creek near Aspen, July 24, 1919, at *Erigeron macranthus*.

***Halictoides marginatus halictulus* (Cresson)**

UTAH: 66 ♂, Ogden, August 30, 1916, asleep in early morning on *Helianthus* flowers. WYOMING: 1 ♂, Sheridan, collected by Dr. Metz. COLORADO: 4 ♂, Boulder, about 5300 ft. alt., on plains, August 7-12, 1919.

Typical *marginatus*, described from Kansas, has clear wings and amber stigma. I have it from Baldwin, Kansas, (Bridwell); the Wray and other specimens listed above conform with it. Cresson described *Pamurgus halictulus* from Colorado and Utah, noting the dusky nervures. With the fine series now before me, I can clearly separate *halictulus* as a distinct race or subspecies having the wings dusky and the stigma dusky-ferruginous, margined with fuscous. This form is not accounted for in

the table in Entomological News, 1916. The two races meet at Boulder, a series taken on the plains west of the town consisting of three *marginatus*, four *halictulus*, and two more or less intermediate. It is, however, astonishing to find that the specimen from Aspen, high up in the mountains, is true *marginatus* with pale amber stigma. I have *halictulus* from Santa Fé, New Mexico; the specimen was compared by Mr. Fox with Cresson's type and found to agree. Contrary to expectation, a specimen from Las Cruces, New Mexico, is also *halictulus*.

CALLIOPSIS Smith

Calliopsis rhodophilus (Cockerell)

COLORADO: 1 ♀, north of Animas, near Durango, about 6600 ft. alt., June 26, 1919; 1 ♀, Ridgeway, about 7000 ft. alt., July 10, 1919.

The above were overlooked when reporting on these bees in Amer. Mus. Novitates No. 24. The Ridgeway female resembles *C. andreniformis* in possessing dog-ear marks but it has the black hair on the head and thorax above that are characteristic of *rhodophilus*. The same form was taken at Las Vegas, New Mexico, July 11, at flowers of *Melilotus officinalis* by Mrs. W. P. Cockerell.

SPINOLIELLA Ashmead

The species of this genus are rather numerous in the West but no locality seems to possess any large number. The greatest concentration or diversification of specific forms seems to be in California, whence nine have been recorded. The American Museum expeditions obtained only three in Colorado. Possibly no others occur in the regions covered, though *S. helianthi* Swenk and Cockerell, collected by Cary in Sioux County, Nebraska, might be expected in eastern Colorado and Wyoming. It has deep yellow bands on the abdomen. *S. meliloti* Cockerell is a very distinct species from southern New Mexico.

Spinoliella zebrata (Cresson)

COLORADO: 48 ♂, 4 ♀, Ridgeway, about 7000 ft. alt., among *Artemisia*, cactus, etc., July 10, 1919, collected by Messrs. Lutz and Bailey.

The large size readily distinguishes this species from the other two. The male has the face below the antennae entirely yellow and the scape yellow in front. The female varies somewhat. In one specimen the light spots below the antennae are lacking and the clypeus is black except the sides broadly and a median band not reaching the upper and lower margins. The male may either have or lack yellow marks on the upper margin of the prothorax.

Spinoliella australior (Cockerell)

COLORADO: 10 ♀, La Junta, about 4100 ft. alt., August 12, 1920; 1 ♀, Pueblo, vacant lots in town, August 9, 1920; 1 ♂, Boulder, about 5300 ft. alt., on plains, August 8, 1919.

The male is distinguished from the light-faced form of *scitula* by the presence of the dog-ear marks. In Sioux County, Nebraska, Swenk found *S. australior* common, but no *scitula* were obtained. *S. scitula* is the characteristic form of the mountain region of Colorado. At Fort Collins, however, Baker found both *scitula* and *australior*.

Spinoliella scitula (Cresson)

WYOMING: 11 ♂, 34 ♀, Green River, about 6100 ft. alt., June 29 and July 2, 1920; 1 ♀, Rock Springs, about 6250 ft. alt., June 29, 1920; 1 ♂, 1 ♀, Jackson, about 6300 ft. alt., July 13-17, 1920. COLORADO: 1 ♂, 2 ♀, Leadville, about 10,300 ft. alt., August 3-5, 1919; 7 ♂, 25 ♀, Glenwood Springs, about 5800 ft. alt., July 22-29, 1919, and August 5, 1920, various collectors; 3 ♀, Alamosa, about 7500 ft. alt., at *Radicula squata* along the Rio Grande, June 15, 1919; 1 ♀, Monte Vista, about 7650 ft. alt., June 16, 1919; 13 ♂, 15 ♀, Rifle, about 5400 ft. alt., on a bare sandy place used as a play-ground, July 19-21, 1919; 1 ♀, north of Animas near Durango, about 6600 ft. alt., at alfalfa, June 26, 1919; 1 ♀, Aspen, about 7900 ft. alt., July 25, 1919.

There is a variation of the female in which the fifth abdominal segment has only very minute, hardly noticeable spots. This must not be confused with *australior*, as the clypeus entirely lacks the light median band of that species and the face-marks in general agree with *scitula*. Five of the six Glenwood Springs females, two from Rifle, and the one from Jackson belong to this variant form.

The males also vary. Those from Glenwood Springs and Leadville have the clypeus largely black; Rifle males vary from much black on the clypeus to hardly any; Green River and Jackson males have the clypeus white, slightly marked with black or with only two dots or small spots. The form with white clypeus is typical *scitula*, the male described by Cresson as *pictipes*.

For the nesting habits, see Bull. Amer. Mus. Nat. Hist., XXII, p. 440.

HOPLITINA Cockerell

This genus was first called *Hoplitella* (1910) but, that name being preoccupied, was altered to *Hoplitina* (1913). The type is *H. pentamera* Cockerell from Claremont, California. In 1916 Crawford added a second species, *H. hesperia*, also from California. When I described *H. pentamera* I also published *Osmia remotula*, based on a female from Claremont, California. The mouth-parts were retracted and were not

examined, but the venation and other characters were so exactly like those of the Old World group *Erythrosmia*¹ that I had no hesitation in referring it there. Now comes a female from the Grand Canyon, Arizona; it is very close to *O. remotula*, certainly congeneric with it, but clearly distinct. The mouth-parts are exposed and the maxillary palpi have five subequal joints, the last two long and very slender. *Osmia* (*Erythrosmia*) *andrenoides* Spinola, which is to be considered the type of *Erythrosmia*, differs from true *Osmia* in having four-jointed maxillary palpi,² which are stout and very bristly, the two middle joints long, cylindrical, and about equal, the last pyriform and about half as long as the penultimate. *Erythrosmia* Schmiedeknecht may be considered a distinct genus, with the species *E. andrenoides* (Spinola) and *E. melanura* (Morawitz). *Osmia fallax*, which I have from Malaga, April, (Morice), appears to be closely related but is placed in a different group on account of the long axillar spines. *Osmia semirubra* Friese, which I have from Jericho, (Morice), probably falls in *Erythrosmia*.

If we thus exclude the American forms from *Erythrosmia* and transfer them to *Hoplitina*, the separation of the latter from *Osmia* becomes difficult. They are, however, remote from typical *Osmia* and it is merely a question of recognizing either a genus or a subgenus. The species assigned to *Hoplitina* in the broader sense may be separated as follows.

1. First three segments of abdomen wholly without hair-bands, even at the sides; tegulae black, faintly reddish posteriorly; first recurrent nervure joining second submarginal cell about twice as far from base as second from apex.
remotula (Cockerell).
First three segments of abdomen with conspicuous white hair-bands, at least at sides.....2.
2. Tegulae black; first recurrent nervure joining second submarginal cell far from base, the second about half as far from apex.....*incanescens*, new species.
Tegulae red or reddish.....3.
3. First recurrent nervure joining second submarginal cell very near base, the second more remote from apex; basal nervure exactly meeting nervulus (falling some distance short of it in *E. andrenoides*)...*pentamera* (Cockerell).
Recurrent nervures equally distant from base and apex of second submarginal cell; proportions of palpal joints also differing.....*hesperia* Crawford.

In the U. S. National Museum Crawford has rearranged the bees of this group and has separated *hesperia* as the type of a new genus, as yet

¹Ashmead regarded *Erythrosmia* as a synonym of *Pseudosmia* Radoszkowsky. *Pseudosmia* was based on a mixture of species, including only one *Erythrosmia*, *andrenoides*. I will designate as the type the first species, *P. arcuata* (Fonscolombe). I have this from Marseilles, (Morice), and it is very different from *Erythrosmia*. *Pseudosmia*, on this basis, is apparently not separable from *Anthocopa* Lapelletier, the type of which is *papaveris* (Latreille). *Furcosmia* Schmiedeknecht, 1886 (*papaveris* here designated the type), is the same group.

²Concerning the palpi of *Osmia*, see Titus, 1901, Canadian Entomologist, p. 257.

unpublished. Possibly this genus should include all of the above species except *pentamera*.

Hoplitina incanescens, new species

♀.—Length about 8 mm.; robust. Black, with the first three abdominal segments clear red, the extreme base of the fourth also red; eyes pea-green. Pubescence abundant, white; first three abdominal segments with white marginal hair-bands at sides; apical segments appearing gray from a covering of appressed hairs. Flagellum very obscurely reddish beneath. Tegulae shining black. Wings hyaline, very faintly dusky; nervures and stigma black; basal nervure falling just short of nervulus, which is arched outward. Mandibles very broad at apex, acutely tridentate; tongue long; second and fifth joints of maxillary palpi each about $95\ \mu$ long, the third and fourth each about 88. Ventral scopa white, very short, carrying very pale yellow pollen.

In general like *H. remotula* but considerably larger, with a polished spot in the median line behind the ocelli, disc of mesothorax rather sparsely and weakly punctured (densely and minutely in *remotula*), abdomen with lateral bands, spurs fuscous. The metathorax is as in *remotula*.

ARIZONA: 1 ♀, Grand Canyon, about 7000 ft. alt., May 24, 1918, collected by Frank M. Jones.

CHELYNIA Provancher

When reporting on this genus in Amer. Mus. Novitates No. 21, the following species was overlooked, being mixed with *Osmia*, which it so much resembles.

Chelynia pavonina Cockerell

WYOMING: 1 ♂, Jackson, about 6600 ft. alt., July 14, 1920. COLORADO: 1 ♀, Pagosa Springs, about 7700 ft. alt., June 22, 1919.

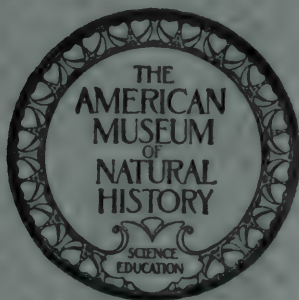
The male has pale hair on the mesothorax, but in the female it is all black. The female is brilliant peacock-green, with the pleura bluer and the mesothorax yellowish green. The male has the abdomen much more purple than in the type, the colors being exceedingly rich.

AMERICAN MUSEUM NOVITATES

No. 41

SPECIES OF AMERICAN PLEISTOCENE
MAMMOTHS
ELEPHAS JEFFERSONII, NEW SPECIES

BY HENRY FAIRFIELD OSBORN



Issued July 8, 1922



BY ORDER OF THE TRUSTEES
OF

THE AMERICAN MUSEUM OF NATURAL HISTORY
NEW YORK CITY

56.9,61 E (119:7)

SPECIES OF AMERICAN PLEISTOCENE MAMMOTHS

ELEPHAS JEFFERSONII, NEW SPECIES

BY HENRY FAIRFIELD OSBORN

It appears probable that all the elephants which arrived in America belong in the division of the MAMMOTHS, subfamily Mammontinæ. Six species of these large and interesting migrants have been successively proposed as follows:

Elephas jacksoni Mather, 1838. Type figured and described. Indeterminate until the type can be located.

Elephas americanus De Kay, 1842. Type figured and described; since destroyed by fire. Undoubtedly a synonym of *Elephas primigenius*.

Elephas columbi Falconer, 1857. Type in the British Museum 40769; cast in the American Museum 1747. Closely related to *Elephas imperator* Leidy.



Fig. 1. Type molar of *Elephas columbi*, right M_2 , drawn from the inner side. One-fourth natural size.

Elephas imperator Leidy, 1858. Type in National Museum 185; cast in American Museum 2568.

Elephas texianus Owen, 1859. *Nomen nudum*; name only without definition or designation of type.

Elephas hayi Barbour, 1915. Excellent figure and description. Nebraska Museum. Regarded as a primitive form related to *Elephas imperator*.

The present article relates explicitly to the type characters of *Elephas columbi*, of *E. imperator*, and of the American specimens referred to *E. primigenius*, three species which have become more or less confused in all the previous literature because the characters of the type specimens

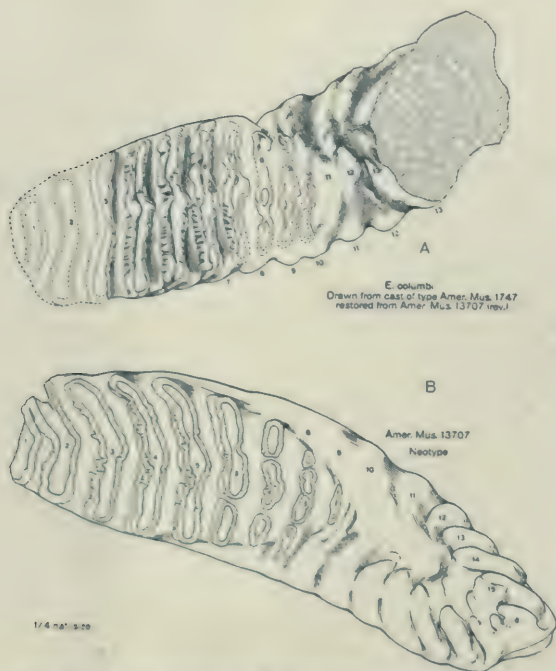


Fig. 2. A. Type molar of *Elephas columbi*, crown view. B. Neotype molar, M₃, of the left side, crown view. One-fourth natural size.

have not been precisely determined and compared. The object of the present communication is to clear up this confusion and to propose ***Elephas jeffersonii*** as a new species of American Pleistocene mammoth.

TYPE CHARACTERS OF *Elephas columbi*

The type characters of this species are clearly shown in the accompanying figures. The type is a third lower molar of the right side, with portions of eleven ridge-plates out of an original total of sixteen or seventeen; this is shown by comparison with the neotype (Amer. Mus. 13707), which consists of non-associated upper and lower molars found in the phosphate beds near Charleston, S. C. In these specimens the ridge formula is: M 3 $\frac{1}{16}$ $\frac{1}{16}$, as shown in Figs. 1-3. The ridge-plates do not exceed six in 100 mm. In the unworn condition (Fig. 3), in which only eight ridge-plates have come into use, the third superior and inferior molars are relatively short anteroposteriorly and deep vertically, because they contain so few ridge-plates.

We thus find by the characters of the type and neotype specimens that the real *Elephas columbi* is not the animal we have been describing under this name; it is a dwarf form, perhaps a dwarf female, of the animal which we have been describing under the name *Elephas imperator*.



Fig. 3. Neotype molars of *Elephas columbi*. C, External view of M_2 . B, External view of M_3 ; same tooth as Fig. 2, B. One-fourth natural size.

CHARACTERS OF THE *Elephas imperator* TYPE

We are indebted to the National Museum for the loan of the *Elephas imperator* type specimen (Fig. 4), enabling us to determine exactly to what portion of the complete neotype tooth (Fig. 5) this ancient and much battered type belonged; the eight ridge-plates of the type which are preserved, in comparison with those of the neotype (Amer. Mus.

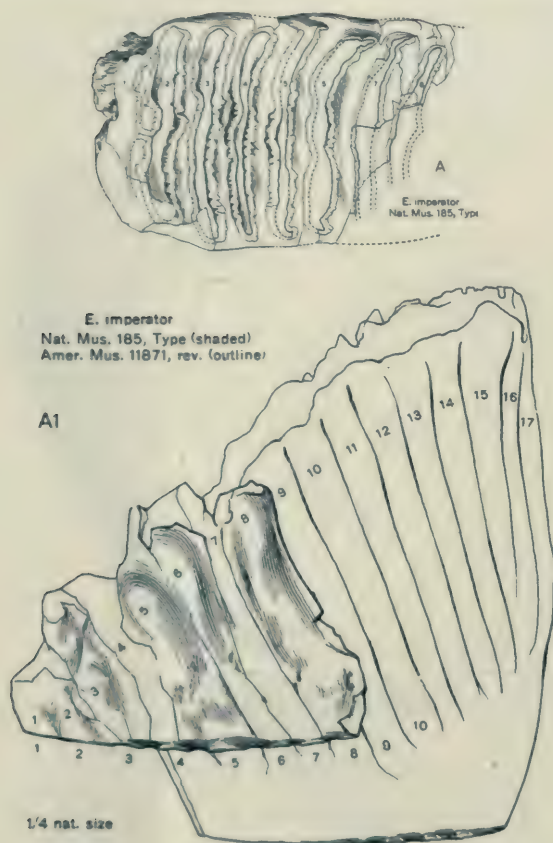


Fig. 4. A, Type molar, right M^3 , of *Elephas imperator* crown view. A 1, Type molar (shaded) placed in position with less worn (unshaded) neotype molar, both belonging to M^3 of the right side.

11871), constitute the anteroposterior portion of a much-worn molar, M^3 of the right side, in which thirteen ridge-plates were in use out of an estimated total of seventeen. Of these plates five occupy a line 100 mm. long; this is because the ridge-plates are arcuate and widest apart in the middle portion of the crown. The neotype tooth (Amer. Mus. 11871), from Guadalupe, Jalisco, Mexico, appears to attain the full size of the superior grinders of this species of mammoth; the ridge formula may be written $M \ 3 \frac{1 \ 7 \ 1 \ 2}{1 \ 8 \ 1 \ 0}$. This accords with the actual average count of the ridge-plates in *E. imperator* by Hay (1914) and by Osborn (1921-1922) in individuals which can without question be referred to *E. imperator*. Doubtless specimens may be found with the ridge-plate formula

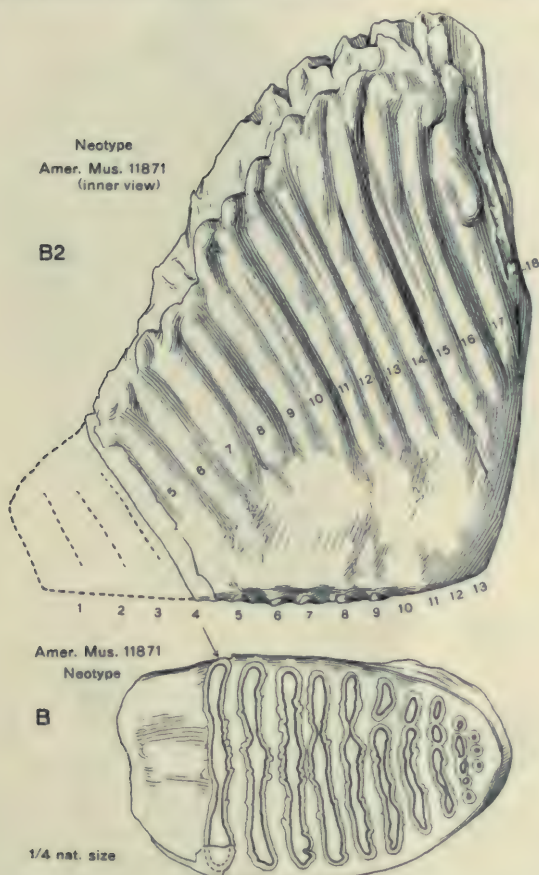


Fig. 5. B 2. Neotype molar of *Elephas imperator*, M^3 of the right side, inner view. B. The same, crown view. One-fourth natural size.

$M^3 \frac{2}{1} \frac{9}{9}$. In the neotype (Fig. 5) thirteen plates were in use; in the referred skull (Amer. Mus. 14476) fifteen plates were in use (Fig. 6B); in the referred lower jaw (Amer. Mus. 14558) fifteen plates were in use (Fig. 6A). The total ridge-plates in M^3 attain nineteen, as clearly shown in Fig. 6A; thus we have the following ridge formulæ:

Ancestral *Elephas meridionalis* of western Europe $M^3 \frac{13-14}{11-14}$; *Elephas columbi* of southern United States $M^3 \frac{17-18}{16-17}$; typical *Elephas imperator* $M^3 \frac{17-18}{18-19}$.

The cranial characters observed in three more or less complete skulls referred to *Elephas imperator* tend to support the direct descent of this animal from the *E. meridionalis* of the Val d'Arno, Upper Pliocene of Italy.

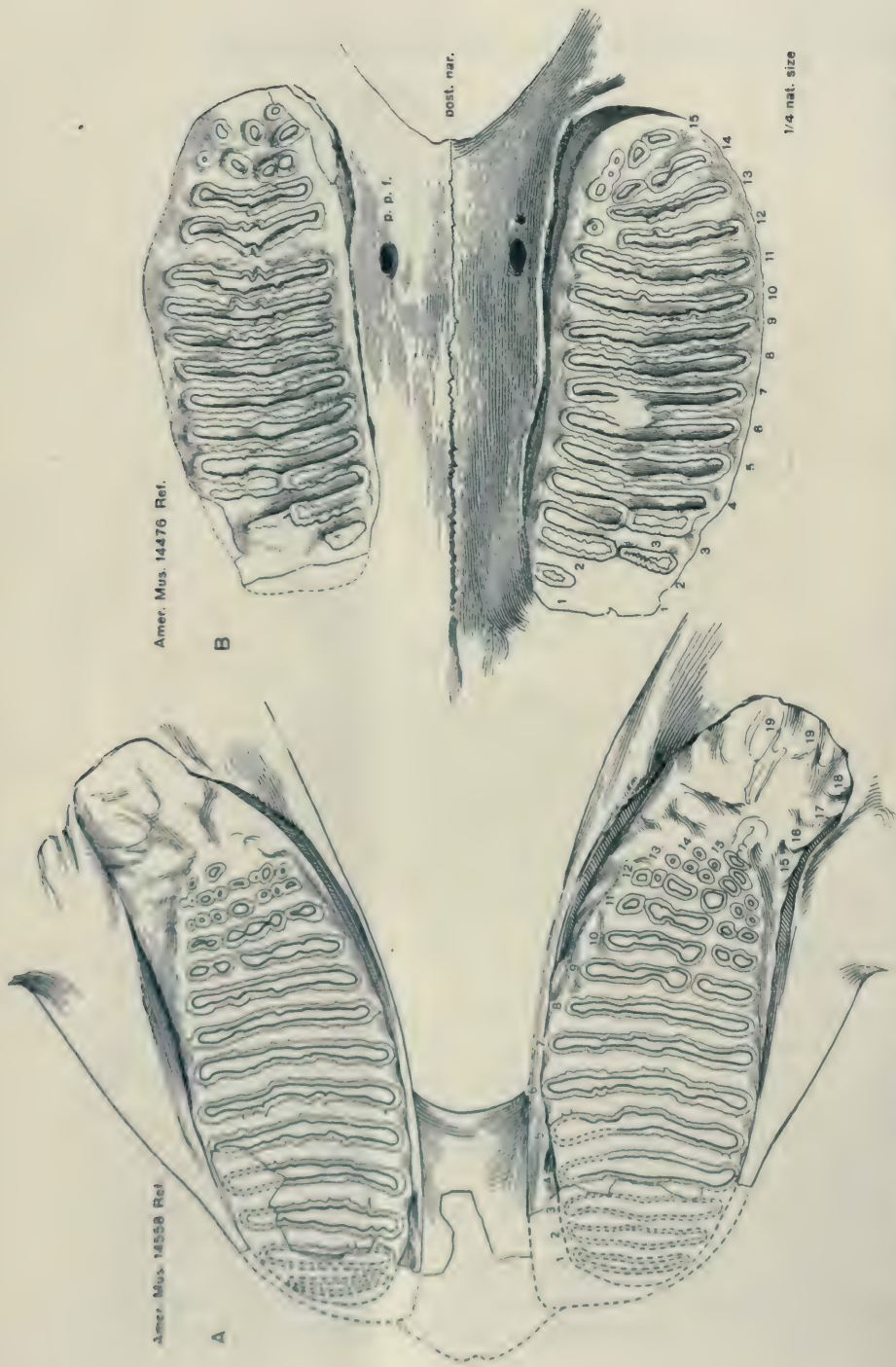


Fig. 6. Superior and inferior molars of *Elephas imperator*, referred American Museum specimens. A, Inferior molars with fifteen ridge-plates in use. B, Superior molars with fifteen ridge-plates in use. These two individuals are believed to be of corresponding age. They exhibit mechanical reversal of the convex and concave surfaces both in the crown contours, crown surfaces, and ridge-plates. One-fourth natural size.

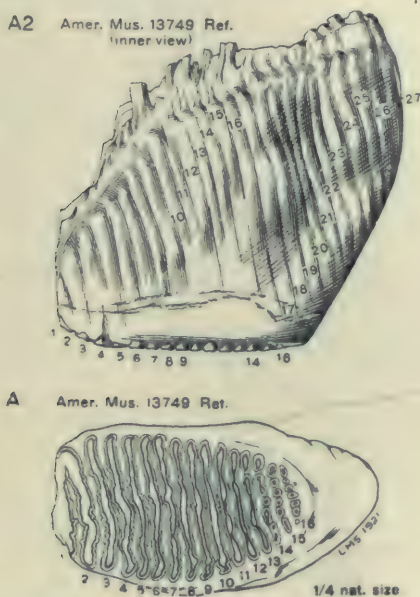


Fig. 7. Right third superior molar, M^3 , of *Elephas primigenius*, Alaska, showing the maximum compression of the ridge-plates. One-fourth natural size.

CHARACTERS OF AMERICAN SPECIMENS REFERRED TO *Elephas primigenius*

Elephas primigenius, which ranged through the entire Pleistocene epoch, from the Lower Pleistocene forest-bed deposits of East Britain to the southerly range of this animal in the middle United States, is a collective species embracing an undoubted progressive evolution and intensification of its specific characters extending over a very long period of time. It exhibits various extremes of fore-and-aft compression of the cranium, with related fore-and-aft compression of the grinding teeth. The cranium is high, pointed at the summit, relatively narrow, and relatively deep. The forehead from the peak of the cranium to the extremity of the nasals is relatively elongate and slightly concave. Including within the definition all the specimens observed by Hay (1914) and by Osborn (1921-1922) which may certainly be included within this collective species, the collective ridge formula of the last two molar teeth is: $M^2 \frac{18-19}{19}$, $M^3 \frac{23-24}{23-24}$.

COMPRESSION.—As compared with *E. columbi* and *E. imperator*, 10 ridge-plates are compressed into a line 100 mm. in length; the most highly compressed tooth observed by Osborn is an M^3 from Alaska (Amer. Mus. 13749) in which 13 ridge-plates are compressed into a line 100 mm.

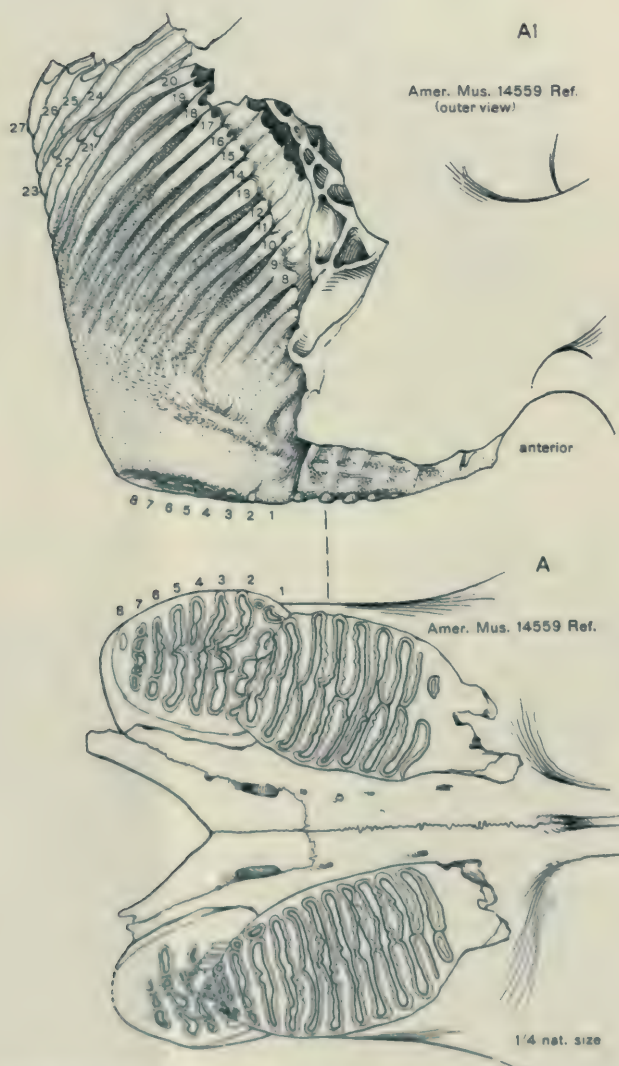


Fig. 8. Fourth and third superior molars of the right side of *Elephas primigenius*, Indiana. A 1, External view showing twenty-seven ridge-plates of M^4 . A, Crown view showing M^3 with eight ridge-plates in use, closely compressed to M^3 with nine ridge-plates in use. One-fourth natural size.

in length (Fig. 7); a similar condition prevails in a female skull from Indiana (Amer. Mus. 14559) in which 13 ridge-plates are compressed into a 100 mm. space, the total number of ridge-plates rising to 27 (Fig. 8). The prevailing condition, however, is of the kind shown in Fig. 9, namely, Amer. Mus. 13752, from Alaska, in which the ridge formula is $M\ 3\ 2\ 3$, here figured with a lower molar (Amer. Mus. 14371) in which the ridge formula is $M\ 3\ 2\ 4$; in these specimens there are 10 plates in a 100 mm. line; these less compressed molars are arcuate, thus the count of the ridge-plates is greater on the concave side of the tooth and smaller on the convex side.

For example, an M^3 (Amer. Mus. 10656) from Germany is as follows:

- 10 ridge-plates in 100 mm. on the outer convex surface,
- 11 ridge-plates on the horizontal coronal surface,
- 12 ridge-plates on the inner concave surface.

In the highly compressed upper tooth (Amer. Mus. 13749), M^3 , from Alaska, the count on all three measurements is the same, namely:

- 13 ridge-plates in 100 mm. on the outer convex surface,
- 13 ridge-plates in 100 mm. on the horizontal coronal surface,
- 13 ridge-plates in 100 mm. on the inner concave surface.

These M^3 conditions are reversed in counting the ridge-plates in the lower molars, M_3 , in which the outer surface is concave and the inner surface is convex. For example, in an M_3 from Alaska (Amer. Mus. 14343) the count is as follows:

- 10 ridge-plates in 100 mm. on the outer concave surface,
- 10 ridge-plates in 100 mm. on the horizontal coronal surface,
- 8-9 ridge-plates in 100 mm. on the inner convex surface.

It follows from the above observations that the horizontal coronal section gives, as a rule, an average between the inner and outer sides; the average in *E. primigenius* is 10 ridge-plates in 100 mm., the minimum observed is 8 in 100 mm., the maximum observed is 13 in 100 mm. This range of compression applies to fifteen specimens ranging through England, Germany, Siberia, Alaska, Ohio, and Indiana.

The worn coronal surface is sometimes fully horizontal, i. e., at right angles to the perpendicular ridge-plates; in such case it registers the exact distance between the plates. In other cases the wear is obliquely horizontal; in which case it increases the actual distance between the plates. It is important to note also that the ridge-plates are arcuate and more closely compressed towards their summits; thus more ridge-plates may be counted in 100 mm. at the summit of the crown than

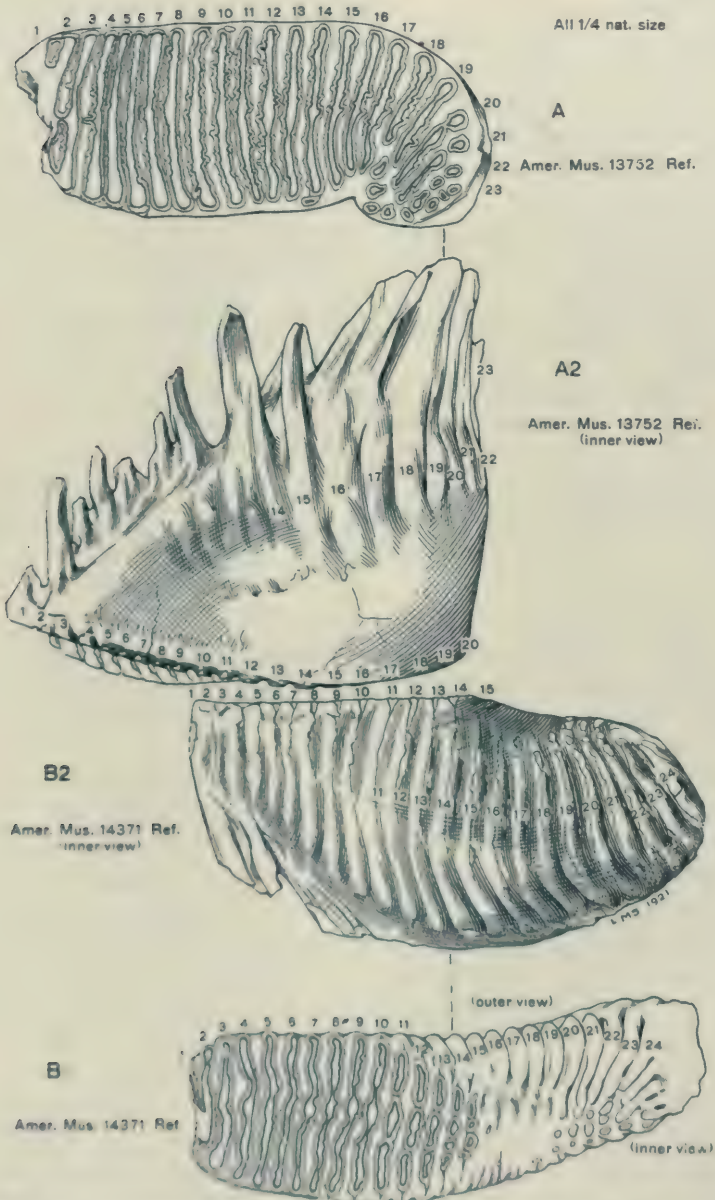


Fig. 9. Posterior superior and inferior molars of *Elephas primigenius*, Alaska, of less compressed type than the molars shown in Figs. 7 and 8. A, Crown view, twenty-three ridge-plates. A 2, Inner view of same. B 2, Inner view of M_3 of another individual. B, Crown view of same.

at the base of the crown, and as a rule the ridge-plate count should be taken midway between the summit and the base, both on the inner and outer sides.

***Elephas jeffersonii*, new species**

The above diagnoses of the real specific characters of the grinding teeth of *Elephas columbi* (closely related to if not identical with *E. imperator*) and of the true *E. primigenius* leaves without a name the animal which previously has been described in all the literature (excepting Soergel's recent Memoir) as *Elephas "columbi."*



Fig. 10. Type skeleton of *Elephas jeffersonii* (Amer.Mus. 9950) as mounted in the American Museum. Reduced to one-fifty-second natural size.

This animal is better known than either of the others; it is represented in all the collections of the principal museums of the United States, as described by Hay (1914), and particularly in the American Museum by four especially fine specimens. Of these we select as the type Amer. Mus. 9950, including the skull, jaws, and greater part of the skeleton (Fig. 10), found near Jonesboro, Indiana, on the farm of Dora S. Gift; purchased for the Museum with the Jesup Fund in 1904, restored and mounted in 1906; described by Osborn in 1907 as *Elephas columbi*, determined by Hay (1914) as *Elephas primigenius*.

As the paratype of this species we select a pair of upper and lower grinding teeth of both sides (Amer. Mus. 10457) acquired with the Warren Collection in 1906 and described by Warren in 1855 (p. 163, Pl. xxviii, fig. C) as *Elephas "primigenius."*

This typical American species is named in honor of the third president of the United States, Thomas Jefferson, in commemoration of his long-continued devotion to mammalian paleontology.

The paratype (Amer. Mus. 10457) best affords comparison with the species diagnosed above; the ridge formula is $M\ 3\ \frac{30}{24^{15}-26}$, the right lower M_3 , (Fig. 11 B2) presenting the last lower ridge-plates more fully developed than in the left lower molar (Fig. 11 B1). It is interesting to observe (Fig. 12 A, B), that these same paratype molars show eighteen ridge-plates in use in both M^3 and M_3 , but that the superior molars show four to five ridge-plates in excess of the inferior molars, the formula being $M\ 3\ \frac{30}{24-26}$. The compression of the ridge-plates is directly intermediate between that of *E. columbi-E. imperator* and that of *E. primigenius*, namely, 7 ridge-plates in 100 mm.; in order to compare this compression with the ridge-plate measurement given by Hay (1914) in his description of "*Elephas columbi*," the inner, outer, and horizontal measurement is as follows:

PARATYPE	TYPE
M^3 outer convex surface, 7-8 ridge-plates in 100 mm.	
oblique mid-coronal surface, $8-8\frac{1}{2}$ ridge-plates in 100 mm.	
inner concave surface, 9-10 ridge-plates in 100 mm.	
M_3 outer concave surface, $6\frac{1}{2}$ -7 ridge-plates in 100 mm.	8 ridge-plates in 100 mm.
oblique mid-coronal surface, $7-7\frac{1}{2}$ ridge-plates in 100 mm.	$7-7\frac{1}{2}$ ridge-plates in 100 mm.
inner convex surface, $6-6\frac{1}{2}$ ridge-plates in 100 mm.	7 ridge-plates in 100 mm.

This compression, with an average of 7-8 ridge-plates in 100 mm., concurs with the measurements given by Hay in nine of the specimens in the National Museum, namely, 7-8 ridge-plates in 100 mm.¹ Comparing the type ridge-plate formula of *E. jeffersonii*, $M\ 3\ \frac{30}{24-26}$, with that of *E. primigenius*, $M\ 3\ \frac{23-28}{23-24}$, we observe that the number of ridge-plates is similar but the lesser compression of ridge-plates in *E. jeffersonii*, namely, 7:100, as compared with *E. primigenius*, 10:100, is correlated with the relatively long, gently arcuate grinders of *E. jeffersonii* as compared with the short, deep, strongly concavoconvex grinders of *E. primigenius*. The paratype molars of *E. jeffersonii* in which eighteen upper and lower plates simultaneously come into use compare closely in measurement and character with the type molars of *E. jeffersonii* in which only sixteen plates have come into use. In the lower molars of the type (Amer. Mus. 9950) the sixteen plates in use indicate that the animal was of about the same age as the paratype in which eighteen plates were in use:

- 7 ridge-plates in 100 mm. on the convex inner side,
- $7-7\frac{1}{2}$ ridge-plates obliquely worn on mid-coronal surface,
- 8 ridge-plates in 100 mm. on the concave outer side.

¹Dr. G. P. Hay writes March 14, 1922: "In counting the ridge-plates I try to count the ridges on the side of the tooth, about half way down and at right angles with the plates." He does not state whether his count is uniformly made on the inner or on the outer side of the tooth, which makes a difference of from one to three plates in the count, as shown above.

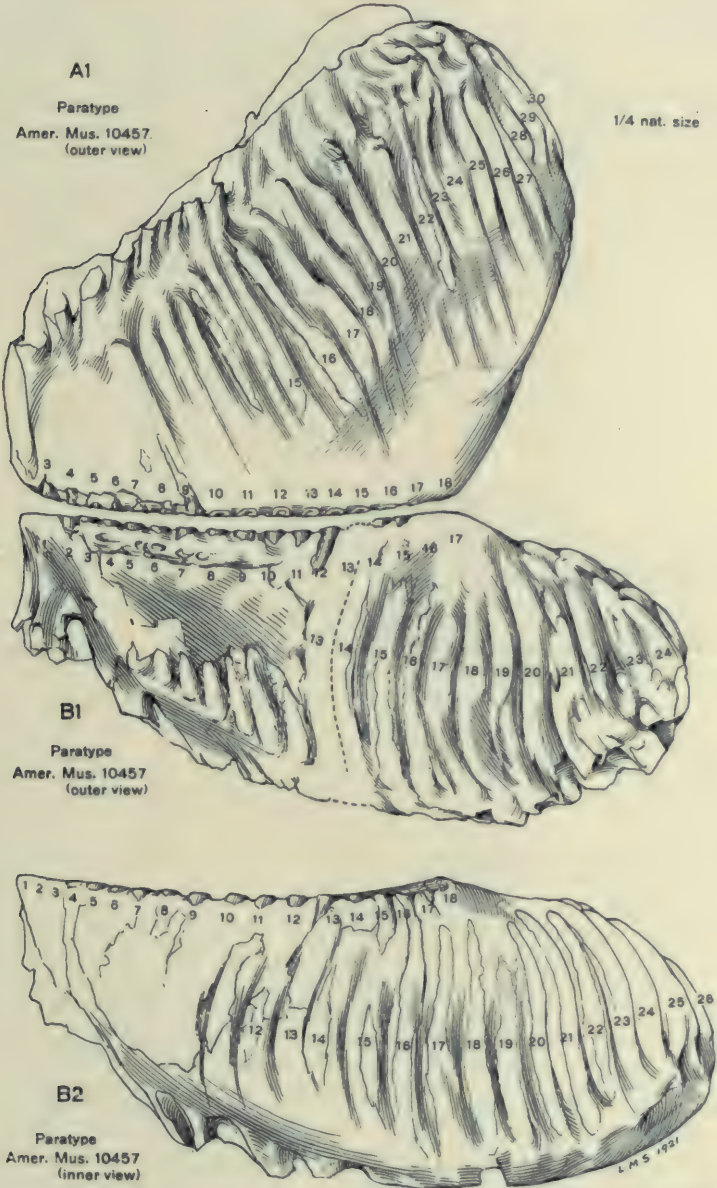


Fig. 11. Paratype molars of *Elephas jeffersonii*, M³, M₃, of the same individual, Amer. Mus. Warren Coll., Zanesville, Ohio.

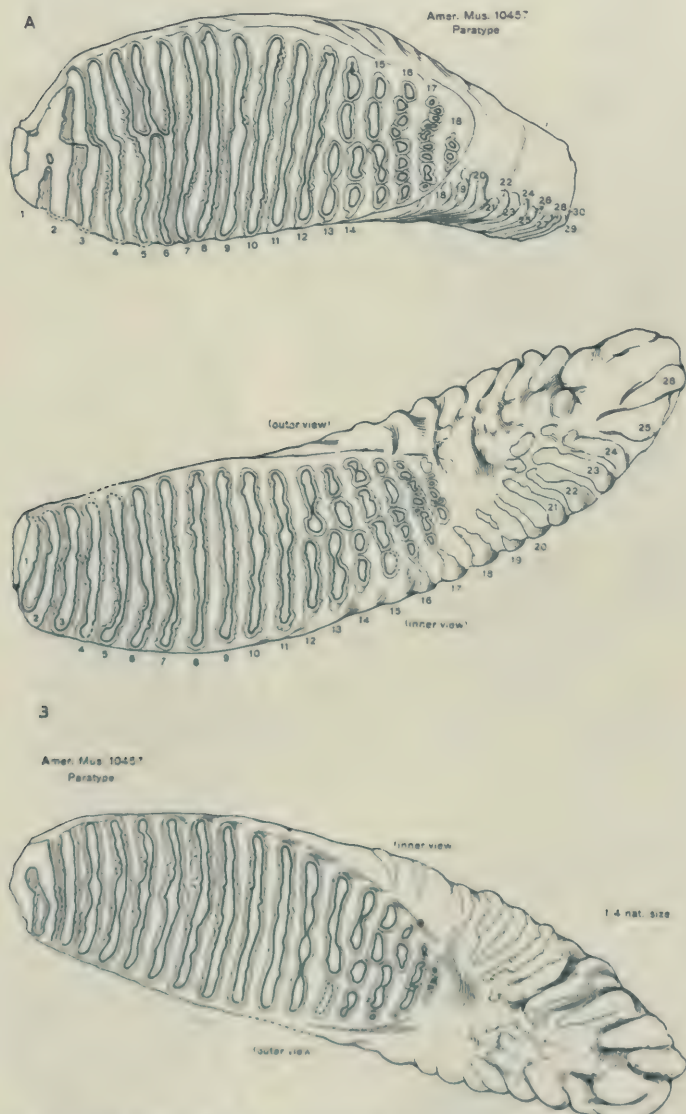


Fig. 12. Paratype molars of *Elephas jeffersoni*, the same specimens as in Fig. 11. A, Crown view of left superior molar, M¹. B, Crown views of right and left inferior molars. Both upper and lower molars with eighteen ridge-plates in use. One-fourth natural size.

CRANIAL CHARACTERS.—Still more obvious are the differences between the relatively long, broad, and shallow crania of *E. jeffersonii* and the relatively short, narrow, and deep crania of *E. primigenius*, proportions which are correlated respectively with the corresponding proportions just described and figured in the teeth.

The four complete skulls of this species known to the writer are those of (1) in the type mounted skeleton (Amer. Mus. 9950); (2) the fine male skull associated with the jaws and a large part of the skeleton (Amer. Mus. Cope Coll. 8681) from Whitman County, Washington, now labeled "*Elephas columbi*"; (3) the young male skull (Amer. Mus. Cope Coll. 14475) from Dallas, Texas, also labeled "*Elephas columbi*." (4) To these should be added the very large male skull (Nat. Mus. 10261) collected near Cincinnati, Ohio; in this specimen the ridge formula is $M\ 3\ \frac{2}{6}$; seventeen plates were in use; the compression of the grinding teeth is greater, namely:

9 ridge-plates in 100 mm. on the outer side, at the worn edge,

9 ridge-plates in 100 mm. on the worn mid-coronal surface.

The cranial characters of this specimen are entirely similar to those of the three skulls in the American Museum collections, except that it is larger and more robust.

CONCLUSION

The American elephant heretofore widely known as "*Elephas columbi*," the Columbian Mammoth, will hereafter be known as *Elephas jeffersonii*, the Jeffersonian Mammoth. The question whether the animal heretofore known as *Elephas imperator*, the Imperial Mammoth, shall hereafter become known as the Columbian Mammoth under the law of priority, must remain open for the present. Certainly the real type of *Elephas columbi* represents an animal very close to the real type of *Elephas imperator*, but inasmuch as the type and neotype of *Elephas columbi* belong to dwarfed individuals, it is possible that when these animals become more fully known we shall find that *Elephas columbi* and *Elephas imperator* may be maintained distinct, as it is eminently desirable they should.

BIBLIOGRAPHIC NOTE.—The first revision of the Pleistocene mammoths and mastodons of America by Dr. O. P. Hay is to be found in 'The Pleistocene Mammals of Iowa,' Iowa Geological Survey, Vol. XXIII, Annual Report, 1912, by O. P. Hay, Research Associate of the Carnegie Institution of Washington, published in 1914. The second revision by the same author is entitled 'Descriptions of Some Pleistocene Vertebrates Found in the United States,' Proceedings of the United States National Museum, Vol. LVIII, No. 2328, by O. P. Hay, Associate of the Carnegie Institution of Washington, published in 1920. The section devoted to the Proboscidea in the 1914 Memoir, pp. 328-449, Pls. XLIII-XLIX, was prepared after the author had examined all the

chief collections in the United States including the Pleistocene collections in the American Museum.

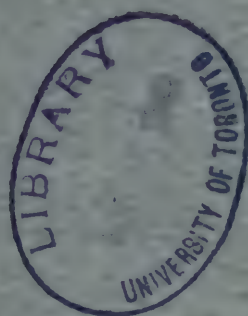
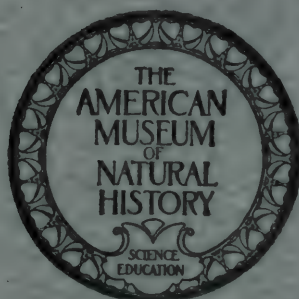
The manuscript of the present article in the American Museum Novitates was sent to the American Museum Press in its present form on June 12, 1922.

AMERICAN MUSEUM NOVITATES

No. 42

DISCOVERY OF CRETACEOUS AND OLDER TERTIARY STRATA IN MONGOLIA

BY WALTER GRANGER AND CHARLES P. BERKEY



Issued August 7, 1922

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DISCOVERY OF CRETACEOUS AND OLDER TERTIARY STRATA IN MONGOLIA¹

By WALTER GRANGER AND CHARLES P. BERKEY

The American Museum commenced its natural history explorations in Asia in 1916. The First and Second Asiatic Expeditions, in charge of Roy Chapman Andrews in 1916-1917 and 1918-1919, were engaged in zoölogical exploration and in laying the foundations for broader work. The Third Asiatic Expedition, sent out by The American Museum of Natural History, the American Asiatic Association, and Asia Magazine, has included zoölogy, palæontology, geology, and geography under the leadership of Mr. Andrews, with Walter Granger as palæontologist, Charles P. Berkey as geologist and Frederick K. Morris as topographer, and other cognate lines of research may be taken up when the results of reconnaissance warrant it.

The scientific results of these expeditions will be published in numbered sequence as indicated below. The following reports or contributions have already been published:

- (No. 1) 'New Chinese Fishes.' By John Treadwell Nichols. Proc. Biol. Soc. Washington, XXXI, pp. 15-20, May 16, 1918.
- (No. 2) 'Description of a New Species of Serow from Yün-nan Province, China.' By Roy Chapman Andrews. American Museum Novitates, No. 6, March 24, 1921.
- (No. 3) 'The Birds of The American Museum of Natural History's Asiatic Zoölogical Expedition of 1916-1917.' By Outram Bangs. Bull. Amer. Mus. Nat. Hist., XLIV, Art. 20, pp. 575-612, December 30, 1921.
- (No. 4) 'Description of a New Loach from North-eastern China.' By Henry W. Fowler, American Museum Novitates, No. 38, May 25, 1922.

RECONNAISSANCE EXPEDITION IN MONGOLIA

On April 21, 1922, the Third Asiatic Expedition left Kalgan, North China, for its announced reconnaissance trip into Mongolia. It is planned to devote the first three weeks of the season to observations along the regular caravan route between Kalgan and Urga, the capital of Mongolia, and the rest of the season to points scattered far to the west, perhaps even as far west as Ulyosutai and Kobdo and the eastward extension of the Altai mountains.

¹Contribution No. 5. Asiatic Expeditions of The American Museum of Natural History.

The chief effort of the present season is to be devoted to geology, palæontology, geography, and zoölogy, but other scientific interests will be cared for in subsequent seasons if the reconnaissance warrants such expansion. It is believed that fields inviting more extended and detailed work will be discovered and that the reconnaissance will furnish a basis for final plans and indicate the nature of the problems that promise best results.

At the close of the season President Henry Fairfield Osborn is expected to join the expedition staff at the headquarters in Peking and will take an important part in the conferences in which plans for the next three years will be formulated.

The scientific staff on the present reconnaissance includes Roy Chapman Andrews, zoölogist, Walter Granger, palæontologist, Charles P. Berkey geologist, and Frederick K. Morris, physiographer.

It is hoped that there may be opportunity to send short notes of observations or discoveries of special interest directly from the field but, in any case, a summary of the season's results will be issued with little delay on the return of the Expedition.

CRETACEOUS STRATA IN EASTERN ASIA.—The Third Asiatic Expedition announces, under date of May 3, 1922, that strata of Cretaceous age, overlain by two distinct Tertiary formations, have been discovered in the Gobi region of southeastern Mongolia.

They were found on the outbound trip from Kalgan to Urga at a point about 260 miles northwest of Kalgan. Strata of Cretaceous age are wholly unknown in Eastern Asia, as far as the writers are aware, and because of the apparent importance of the find, it was decided to leave the geologists in camp at this place while the rest of the party moved on. Accordingly Messrs. Berkey, Granger, and Morris spent a week in additional inspection of the ground and furnish the notes for this memorandum.

The best exposures of the Cretaceous formation are in the vicinity of the small salt marsh Iren Dabasu, where a total thickness of about 150 feet of nearly horizontal strata is judged to be of this age. Tertiary beds not older than the Miocene lie on top of the Cretaceous strata and are best exposed about five miles south of Iren. Twenty miles farther south early Tertiary beds were found in essentially the same relation.

In each occurrence of the Tertiary beds only a single horizon has furnished determinative fossils, but in the Cretaceous formation below, there are at least two fossil bone-bearing horizons. Fortunately the faunal evidence is unmistakable. Otherwise the widely different age

relations of the strata would not be suspected, for the corresponding physical breaks are inconspicuous and the beds are almost perfectly conformable.

The structural basin in which these strata lie measures forty miles across from north to south and is floored with ancient slates and limestones of extremely complicated deformation structure. This is only one of six basins of similar form and relation between Kalgan and Iren but it is much the longest one and the only one in which, thus far, the presence of strata of Cretaceous age has been proven.

In the vicinity of the small salt lake Iren Dabasu, the Cretaceous beds lie immediately on the slate floor of the basin and between this base and the first determinable beds of later age, in this case late Tertiary, about 150 feet of strata are exposed. The bottom members are dominantly sands and sandstones, prevailingly thin-bedded, some of which are strongly cross-bedded and well cemented. The middle members become finer grained, more mixed with clay and more variable in color. The upper beds are dominantly clays and sandy clays and very fine sands, varying in color from white to dark red and drab and yellowish green. No less than twenty distinct beds or layers can thus be distinguished, all of which are regarded as belonging to a single geologic formation.

Only the lower members of this formation have been found to be fossiliferous. The list includes:

- 1.—Predentate dinosaurs, probably of the bipedal type.
- 2.—Carnivorous dinosaurs of at least two genera, the smaller one being of the *Ornithomimus* type.
- 3.—Crocodiles.
- 4.—Turtles of the *Trionyx* type.
- 5.—A few pelecypod shells.

Obretcheff, the Russian geologist, who gives an account of a reconnaissance trip over this same route from Ude to Kalgan, describes sedimentary beds at many places, always referring to them as representatives of the Gobi formation. His only age determination, however, was made on the basis of a few fragments of *Rhinoceros*, found at the escarpment five miles south of Iren. These remains were judged by Eduard Suess, to whom they were referred, to indicate an age not earlier than the Miocene. The Tertiary age of the rest of the occurrences mentioned by him seems to have been taken for granted and apparently that is in general correct, but it is evident that the Gobi formation cannot properly

include strata of both Tertiary and Cretaceous ages. It is clear also that the term Gobi formation or Gobi series is properly applied to the Tertiary beds instead of to those of Cretaceous age. The finding of a Cretaceous formation below makes a new designation necessary. For this purpose nothing seems to be as appropriate as the name of this locality. We therefore propose the term IREN DABASU FORMATION for these beds.



Fig. 1. Sketch map showing location of type sections of Iren Dabasu Formation (Cretaceous) 1; Irdin Manha Formation (Eocene) 2; Houldjin Formation (Miocene) 3.

THE HOULDJIN BEDS (MIDDLE TERTIARY).—For the late Tertiary beds found five miles farther south and belonging to the Gobi Series of Obretcheff we propose the term **HOULDJIN BEDS**, taken from the local name of the upland formed by these beds. They are characterized by the following fossil content:

- 1.—A rhinocerid.
- 2.—A large carnivore.
- 3.—An artiodactyl of the size of a Virginia deer.
- 4.—An enormous mammal, probably a perissodactyl and possibly related to or identical with *Baluchitherium*, discovered by Forster Cooper in Baluchistan.
- 5.—A tortoise of large size.

There is a sharp physical change immediately below this formation and only the coarse sandy conglomeratic member at the very base has been found to be fossiliferous. The fossil remains are unusually fragmentary.

IRDIN MANHA FORMATION (EARLY TERTIARY).—For the early Tertiary beds found twenty-five miles farther south, also assumed properly to belong to Obretcheff's Gobi Series, we propose to use the term **IRDIN MANHA FORMATION**. It appears to lie immediately on Cretaceous beds, the Iren Dabasu formation, and again there is a sharp change in type of rock. The beds are cross-bedded sandstones, limy sands and pebbly sandstones. Only the lower member has been found to be fossil-bearing. It is characterized by the following forms:

- 1.—Small Lophiodonta of at least two species in great abundance.
- 2.—A perissodactyl about the size of the Upper Eocene titanotheres and possibly related to this family.
- 3.—A small artiodactyl.
- 4.—A small creodont.
- 5.—An abundance of turtles of both the hard-shelled and soft-shelled groups.
- 6.—Teleost fishes.

The geologic column for the Iren Dabasu basin therefore is essentially as in the following table.

Recent	Uplift and Erosion				
	Peneplanation				
Tertiary	Miocene or Later	Upper barren sands Rhinoceros gravels	25'+ 5'	The Houldjin Formation	The Gobi Series
	Oligocene or Eocene	Upper barren sand- stones The Lophiodont bed	25'+ 4'	The Irdin Manha Formation	
	Physical and Faunal Break				
Cretaceous	Upper barren members, chiefly clays, marls and fine sands		90'	The Iren Dabasu	
	Lower or Dinosaur beds, chiefly sands and sandstones		60'	Formation	
	Great unconformity				
Pre- Cretaceous	The old-rock floor, chiefly slates, limestones and igneous rocks				Probably The Nank'- on Series

VERTEBRATE FOSSILS, ADDITIONAL DETAILS.¹—Remains in all three beds are fragmentary, decidedly so in the Houldjin grave's, but they are of unusual interest apparently and we have taken everything which has any character. Dinosaurs are represented by one complete tibia, ends of femora and humeri, presacral and caudal centra, many good foot bones, including claws of fore and hind feet, portions of a small carnivorous dinosaur skull with two or three teeth, and two teeth of a predentate, as well as two portions of jaw with the alveoli of some teeth, also predentate. Remains of the small *Ornithomimus*-like creature are particularly abundant and the last day at Iren Dabasu we picked up probably fifty good foot bones and centra from two or three knolls. We could find no teeth of the little fellow though—wonder if he was edentate like *Struthiomimus*? The Cretaceous exposures are very limited so far as we could see, but may, of course, outcrop in other basins to the east or west of the road. We did not have time to extend our work in either direction. The outcrops we did see will stand a more careful going over.

The Houldjin gravels are exposed as a rather thin capping to a low bench of Cretaceous which we followed for several miles. Things are badly broken up here—even such massive bones as the heads of femora and humeri were usually cracked into several pieces before deposition. There is one fine bone—a calcaneum of the big beast which would be a match for the astragalus of *Baluchitherium*² (?). I can think of nothing else to which it might belong. It is as long as the great *Megatherium* calcaneum from Long Branch, N. J., but is not edentate. A head of a femur is the size of one's head and other limb bone ends correspond. Some enormous rhinoceros teeth (broken) may belong with this animal. Smaller teeth are surely *Rhinoceros*. We did not explore the full length of the exposure and there are possibilities in excavation at one or two points of the bluff where we did explore.

The Irдин Manha beds offer the greatest opportunity for future work. Mammalian remains are abundant though fragmentary and we examined less than two miles of a line of exposures extending many miles both east and west of the trail. A small lophiodont (*Helalectes*-like) is most abundant and we got numerous teeth besides two maxillæ (one with premaxilla and orbital region) and a few lower jaws, also numerous foot bones, limb bones and vertebrae. Next in abundance is a perissodactyl, looking much like our late Eocene titanotheres. We have several premolars, many incomplete molars and one lower jaw with p_3 - m_3 in fair condition.

¹Commented in a letter by Mr. Walter Granger, dated May 10, 1922.

²A gigantic perissodactyl described by C. Forster Cooper from Baluchistan.

Other forms are curiously rare, a creodont lower jaw and an artiodactyl astragalus or two being the only things noted. Trionychids are common and we saw a complete though badly broken carapace which we were hurrying to get to our car before a storm overtook us the last day we were there. We made three trips down from Iren Dabasu camp but could not do more as our food was getting short and we had to join the rest of the party here.

Much additional detail is in possession of the Expedition which will appear in due course, and it is expected also that further investigation of this area and related ones will be made at a later time.

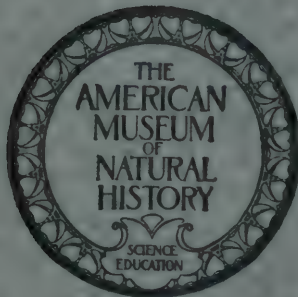
THE THIRD ASIATIC EXPEDITION.

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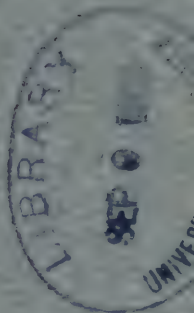
THE SPECIES AND GEOGRAPHIC RACES
OF *STEGANURA*

By JAMES P. CHAPIN



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THE SPECIES AND GEOGRAPHIC RACES OF *STEGANURA*¹

BY JAMES P. CHAPIN

Despite the modern tendency toward subdivision, ornithologists have come to think of the paradise whydah as a single species. In some recent papers, it is true, a northeast African subspecies has been recognized, under the name *verreauxii*, and some authors, too, have followed Professor Oscar Neumann² in calling the Senegal bird *Steganura paradisea aucupum*. Aside from the browner nape of *aucupum*, the characters of these subspecies have been regarded with some hesitation. A shorter wing was believed to distinguish *verreauxii* from the south African *paradisæa*.³

Examination of the series of *Steganura* in the museums of Washington, Philadelphia, Cambridge (Mass.), London, Tring, Tervueren, and Vienna, in addition to material in the American Museum, has confirmed my view as to the existence of two distinct species; and in Vienna I was surprised to find a very broad-tailed specimen of *S. aucupum*, collected by Mr. Rudolf Grauer at Uvira, on the north end of Lake Tanganyika. So *aucupum* is not confined to northwest Africa, but extends, I find, to Eritrea, Angola, and even Gazaland. Furthermore, its range is intercepted on the west by the great Cameroon-Congo forest, where no paradise whydah occurs; and in northeast, east, and southern Africa its representatives are subspecifically distinct from the typical Senegal bird. *S. paradisæa* is exclusively east and south African, and cannot be subdivided.

The five forms of the genus which I find recognizable are shown in Figure 1. While the ranges of the two species overlap extensively, every form has a definite geographic distribution, as follows:

Steganura aucupum aucupum—Senegal to Shari River region.

S. a. longicauda—Upper Uelle District.

S. a. nilotica—Kordofan and Blue Nile to Eritrea.

S. a. obtusa—Kenya Colony and Lake Kivu, south to Gazaland and west to Angola.

Steganura paradisæa—Eritrea and Abyssinia south through East Africa to Cape Colony, also to Damaraland and Angola on the west.

¹Scientific Results of the American Museum Congo Expedition. Ornithology, No. 7.

²1908, Bull. Brit. Orn. Cl., XXI, p. 43.

³Sclater and Praed., 1918, Ibis, pp. 459-460.



Fig. 1. The forms of *Stercorarius*. One-third natural size.

- A.—*S. auctupum auctupum*, Diourbel, Senegal, October 8, 1907 (type).
 B.—*S. a. longicauda*, Faradje, Felle district, November 9, 1911 (type).
 C.—*S. a. nilotica*, near Abu Zor, Blue Nile, January 6, 1913 (type).
 D.—*S. a. obtusa*, Pungo Andongo, Angola, July 1, 1903 (Ansorge coll.).
 E.—*S. paradisaea*, Tertale, S. Abyssinia, June 8, 1912 (Mearns coll.).

The adult males differ most markedly in the form and dimensions of the long tail feathers, which are relatively constant in each subspecies when once they have reached their full growth. But *S. a. nilotica* and *S. paradisæa* are also distinguished by their yellower hind-necks; and *S. a. obtusa* has a decidedly longer wing than any other form.

My interest was first aroused in this question by the specimens of paradise whydah which Mr. Herbert Lang and I collected in the north-eastern corner of the Belgian Congo. They are clearly nearest the Senegal form, though coming from so nearly the center of Africa. They agree in the brownish color of the nape; but a far better character is the shape of the longest pair of rectrices, which do not taper towards the tip in *aucupum*, as in so many of the birds from eastern and southern Africa. Strangely enough this distinction was not even mentioned by Neumann.

I am by no means the first to make this fact known. One would think that Linnæus might have noticed it, for his description of *Emberiza paradisæa*, in 'Systema Naturæ,' 10th edition, 1758, p. 178, was based on figures of earlier authors which showed tails of both shapes. His description, in this edition, cannot be restricted to any one of the forms since recognized, and the habitat was stated simply as Africa. In the 12th edition, however, of 1766, p. 312, besides adding one more reference (from Brisson), Linnæus improved the description by stating that the longest tail feathers were acuminate and falcate, and that the bird lived in Angola. Thus it is clear that he meant particularly the species figured in color by Edwards in 'Nat. Hist. Birds,' part 2, 1747, p. 86, Pl. LXXXVI.

Taxonomic importance was first attributed to the form of the tail by Cassin, when he described *Vidua verreauxii* from Abyssinia¹ with a tapering tip to the tail, and attempted to fix the name *paradisæa* on west African birds with broad-tipped tails. His attention, no doubt, had been called to this by the observant collector, J. Verreaux; and the name *Vidua sphænura*, which Bonaparte proposed for the same Abyssinian form a few months later,² was stated to be a manuscript name of Verreaux's.

So Verreaux long preceded me in the opinion that the difference in the tails is of more than subspecific value, and his view was adopted by authors of some well-known works on African birds. Reichenbach accepted *paradisæa* and *sphenura*,³ referring to the first-named as coming

¹1850, Proc. Acad. Nat. Sci., Philadelphia, V, p. 56.

²1850, 'Consp. Gen. Avium,' I, p. 449.

³1862, 'Die Fortsetzung der Singvögel,' p. 63.

with certainty only from Angola. Finsch and Hartlaub¹ called them tentatively *paradisæa* and *verreauxi*. Of recent years it has become customary to treat these at most only as subspecies. Then in 1908 Neumann showed that the Senegal bird was still without a name, although it was the best-known variety in captivity. He named the northwestern bird *S. paradisæa aucupum* and retained the name *verreauxi* for northeastern birds; but the latter is really not separable, I find, from the form Edwards described from Angola, and on which *paradisæa* of Linnæus is based.

What I have to propose, therefore, is (1) the specific distinctness of *aucupum* and *paradisæa*; and (2) the recognition of three new subspecies of *aucupum*, from regions in which the species has hitherto been unrecorded, but where two of them sometimes live side by side with *paradisæa*.

More complete descriptions follow.

***Steganura aucupum aucupum* O. Neumann**

Steganura paradisæa aucupum O. NEUMANN, 1908, Bull. Brit. Orn. Cl., XXI, p. 43 (type locality Diourbel, 150 km. E. of Dakar, Senegal).

Vidua paradisæa SWAINSON, 1837, 'Birds of West Africa,' I, p. 172 (Senegal).

ADULT MALE IN BREEDING DRESS.—The longest (=2d) pair of rectrices is band or ribbon-shaped to within a very short distance of the tip. Hind-neck of a light golden-brown color, very like that of the chest. Eighteen adult males give the following measurements: wing, 73–80; longest rectrices, 203–260. Care must always be taken in measuring the tail to ascertain, by examining the bases of the feathers, that it is fully grown.

SPECIMENS EXAMINED (adult males in breeding plumage).—Senegal: Diourbel, 3; Tieli, 3; Thiès, 1; Kirtaona, 1; "Senegal," 8. "Sene-gambia," 2. Gambia River, 2. "Sierra Leone," 1. French Sudan: Beledugu region, 2. Gold Coast Colony: Gambaga, 2. Northern Nigeria: near Sokoto, 2. Lake Chad territory: Zinder, 2. Shari River region: Abarin, 1; Gulfei, 1; Bahr Keta, 1. Ubangi region: Fort Sibut, 1.

DISTRIBUTION.—From Senegal and the French Sudan eastward to Lake Chad and the Shari River. On the south the limits appear to be fixed by the forests of the Guinea coast and the Cameroon. The specimens from "Sierra Leone" may not be accurately labeled. The easternmost representatives, collected by the second expedition of the Duke of Mecklenburg in the neighborhood of the Shari and Ubangi, are typical *aucupum*, for their longest tail feathers range from 203 mm. (Abarin)

¹1870, 'Vögel Ost-Afrikas,' p. 424.

to 260 mm. (Ft. Sibut). Throughout all this area *Steganura paradisæa* is unknown.

***Steganura aucupum longicauda*, new subspecies**

TYPE.—♂ ad. in breeding plumage, No. 161983, Amer. Mus. Nat. Hist.; Faradje, Uelle District, November 9, 1911 (Amer. Mus. Congo Exp.).

MEASUREMENTS OF THE TYPE.—Wing, 78 mm.; longest rectrices, 298; exposed culmen, 10.5; metatarsus, 17.

DESCRIPTION OF TYPE.—Coloration exactly as in the preceding form, the brown of the breast rather light, and of small extent, the feathers of the hind-neck of the same golden brown. The long rectrices are however much better developed than in *S. aucupum aucupum*, and in the two other males from Faradje they measure 284 and 295 mm., the wings being 78 and 79 mm.

SPECIMENS EXAMINED.—Upper Uelle district: Faradje, 2 immature males, and 3 adult males in breeding plumage.

DISTRIBUTION.—None of the male specimens seen in any other museum can be referred to this form, so that for the present it is known only from the region of Faradje on the Dungu River. I saw living birds in breeding plumage, however, at Niangara, on the Uelle River, and Aba, on the border of the Lado Enclave. That the range of the subspecies is even more extensive may be assumed from the fact that it is somewhat migratory, and found in the Upper Uelle only from early November to January. Probably the rest of the year is spent to the northward in the southern Bahr-el-Ghazal.

Here again the range is not known to be shared with *S. paradisæa*, although one specimen of the latter was collected by Emin at Lado.

***Steganura aucupum nilotica*, new subspecies**

TYPE.—♂ ad. in breeding plumage, No. 63579, Museum of Comparative Zoölogy; 10 miles above Abu Zor, Blue Nile, January 6, 1913. (Phillips Sudan Exp.)

MEASUREMENTS OF THE TYPE.—Wing, 78 mm.; longest rectrices, 217; exposed culmen, 10; metatarsus, 17.5.

DESCRIPTION OF TYPE.—Brown of the chest somewhat darker and more extensive than in *S. a. aucupum* and *longicauda*, whereas the whole hind-neck, in distinct contrast to the chest, is of a pale straw-yellow.¹ The tail feathers average much shorter than in either of the preceding races. The 12 adult males of *nilotica* measured by me give the following results: wing, 75–80 mm.; long rectrices, 191–224.

SPECIMENS EXAMINED (adult males in breeding plumage).—Eritrea: Mai Uassen, 1; Scetel, 1. "Abyssinia," 1. Sennar: Abu Usher, 1; Roseires, 5; 10 miles above Abu Zor, 1; Abu Haraz, 1; "Sennar," 1.

¹Wear and bleaching through exposure, in the other races of *aucupum*, sometimes cause the nape to become unusually yellow.

White Nile: Jebelein, 4; "White Nile," 1. Kordofan: Barra, near El Obeid, 1; "Kordofan," 3. "Sudan" (probably Kordofan), 1. "Bahr-el-Ghazal," 1. "Northeast Africa," 1.

DISTRIBUTION.—From Eritrea to the Blue and White Niles, Kordofan, and perhaps the northern Bahr-el-Ghazal. The eastern edge of its range is shared with *S. paradisæa*, but *nilotica* is either very rare or altogether wanting in Abyssinia.

***Steganura aucupum obtusa*, new subspecies**

TYPE.—♂ ad. in breeding plumage, No. 25812, collection of Mr. J. H. Fleming, Toronto; from Luchenza, Nyasaland (collected by Nisbet).

MEASUREMENTS OF THE TYPE.—Wing, 82 mm.; longest rectrices, 200; exposed culmen, 10; metatarsus, 14.

DESCRIPTION OF TYPE.—The brown of breast is as dark as in *paradisæa*, and consequently much more marked than in any other race of *aucupum*. There is, moreover, much the same contrast between the nape and chest as in *paradisæa*, for the hind-neck is yellow with very little trace of brown. On the other hand the long rectrices differ more than ever from those of *paradisæa*, for they are shorter and broader than in the other races of *aucupum*. In the type these feathers measure 35 mm. in width, and of course do not dwindle in size till close to the tip.

Measuring the width of the longest rectrices in a number of examples of each race of *aucupum*, I obtained the following figures: *aucupum*, 25–27; *longicauda*, 29–32; *nilotica*, 24–30; *obtusa*, 35–37. There is much the same difference in the width of the median pair of rectrices, for in the type of *aucupum*, I found them 23 mm. broad, and in a specimen of *obtusa* from Angola 35 mm. This median pair of tail feathers is usually entirely hidden by the second, greatly lengthened pair. Figures of the birds often show them too plainly, and this is equally true of the figure accompanying the present paper. It seemed desirable to indicate their length, otherwise only the upper borders and the hair-like tips, at most, should have been visible.

There is a good deal of variation in the color of the hind-neck of *obtusa*. In some skins, like the type, it is as yellow as in many *paradisæa*, but in others a distinct brownish wash is perceptible, probably when the feathers are freshest. The dark brown of the chest, often a deep chestnut, in combination with the broad, stubby tail feathers, makes it easy to recognize.

The 30 adult males I have measured have longer wings than any other group in the genus, 80–89 mm. Their tails were from 176 to 216 mm. in length.

The difference in length of wing which Selater and Praed¹ pointed

¹1918, *Ibis*, p. 469.

out between paradise whydahs from southern and from northeastern Africa is to be explained as follows: in the British Museum there are many specimens of *S. a. obtusa* from the south, especially from Nyasaland, and these would bring up the average very considerably, even were the southern *paradisæa* included with them.

SPECIMENS EXAMINED (adult males in breeding plumage).—Kenya Colony: Escarpment, 1. Kivu district: Kibati, 1; Uvira, 1. "Tanganyika," 1. Manyema district: Munie Mboka, 1; Lubilu, 1; Dogodo, 1; Niembo, 1. Katanga district: Funda Biabo, 3; Lualaba River, 1; Kaluli River, 1. Northern Rhodesia: Petauke, 1. Nyasaland: Luchenza, 1; Mlanji, 3; Chiradzulu, 1; Mpimbi, 1; Namaramba Lake, 1; Ntondwe, 1; Fort Lister, 1; Zomba, 2; Lake Shirwa, 1; "Nyasaland," 1. Northern Gazaland, 1. Loanda: Pungo Andongo, 1. Mossamedes: Gambos, 1; Tuandiva, 1; Kasinga River, 1.

DISTRIBUTION.—The most northerly record known to me is that of a male collected by Doherty at Escarpment, Kikuyu Mts., Kenya Colony, but the bird must be uncommon in that part of East Africa. It has also been taken at Kibati, just north of Lake Kivu, by Pilette, and by Grauer at Uvira, on Lake Tanganyika. Southeast of the Congo forest it becomes more common; Pilette secured four more males in the Manyema district between Tanganyika and Kasongo, and they have been taken in the Katanga by Neave and by de Baillet-Latour. In Nyasaland this is the common paradise whydah, and numbers have been collected by Sharpe and Whyte. Angola has both *obtusa* and *verreauxii*, as shown by the collections made by Anson for Lord Rothschild. He obtained *obtusa* at Tuandiva, Gambos, and Pungo Andongo. A specimen of van der Kellen's is from the Kasinga River. In southeast Africa the species extends even farther than Lake Shirwa, for Swynnerton has taken a specimen in northern Gazaland.

***Steganura paradisæa* (Linnæus)**

Emberiza paradisæa LINNÆUS, 1758, 'Systema Naturæ,' 10th Ed., p. 178 (type locality Africa, restricted in 12th Ed. to Angola).

Vidua verreauxii CASSIN, 1850, Proc. Acad. Nat. Sci. Philadelphia, V, No. 3, p. 56 (Abyssinia).

Vidua sphænura BONAPARTE, 1850, 'Consp. Gen. Avium,' I, p. 449 (Abyssinia).

Steganura paradisæa australis HEUGLIN, 1861, 'Forschungen über die Fauna des Rothen Meeres und der Somali-Küste,' Petermann's Mittheilungen, VII, p. 24 (Abyssinia, Danakil, and Somali coasts).

Vidua paradisæa orientalis HEUGLIN, 1871, 'Orn. Nordost-Afrikas,' I, p. 583 (Northeast Africa).

ADULT MALE IN BREEDING DRESS.—The elongated second pair of rectrices has a characteristic outline, broad at the base but beginning to taper at less than one-half the length, and extending out as thin, pointed streamers. Their length is more variable than is usual in *S. aucupum*, but there the variation is not geographic. The brown of the breast is dark, and contrasts strongly with the straw-yellow of the hind-neck.

To make sure that northern and southern birds of this species were not separable, I have carefully compared their measurements. In 24 adult males from north of the equator (Eritrea to Kenya Colony) I find: wing, 76–81; long rectrices, 245–344. For 21 from south of the equator (Transvaal and Angola to Tanganyika Territory): wing, 76–83; long rectrices, 270–336.

SPECIMENS EXAMINED (adult males in breeding plumage).—Eritrea: Salamona, 1. Somaliland: Raia Wachali, 1; Smith River, 1. Abyssinia: Tadejemulka, 1; Koomegalee, 2; Dire Daoua, 3; Ourso, 12; Tertale, 3; Goura, 1; Furza, 1; Dire Ela, 3; Karaba, 1; Galla countries, 4; Darro Mts., 1; "Abyssinia," 3. Anglo-Egyptian Sudan: Sennar, 1; Mongalla, 9; Lado, 1. Kenya Colony: Baringo, 1; Muressi (Turkwell R.), 1; Mutias Mumomi, 1; Kerio River, 1; Manda Island, 1; Lamu, 1; Athi River, 1; S. E. Mt. Kenia, near Tana R., 1; Kitui, 1; Kibwesi, 1. "British E. Africa," 1. Tanganyika Territory: Morogoro, 1; Ukami, 1; Ugogo, 2; Dar-es-Salaam, 1; "Tanganyika," 1. Mozambique: Tette, 4. Angola: Loanda, 1. Mossamedes: Tuandiva, 1; Cavallana, 1; Catequero, 1; Chahivi, 2. Damaraland: Omaloko, 1. Southern Rhodesia: Bulawayo, 4; Nonyonko (?), 1; Tati, 1. Transvaal: Rustenberg, 5. Zululand: Etchowe, 2. Natal: Port Natal, 1. "South Africa," 1. (One specimen of *paradisæa* in the British Museum is labelled "R. Gambia, Whitely," but surely in error. The only specimen taken with certainty west of the White Nile is one collected at Lado by Emin Pasha.)

DISTRIBUTION.—From Eritrea across Abyssinia to Mongalla and Lado on the Upper White Nile, and to the coast of Kenya Colony. Thence southward to Tanganyika Territory, Southern Rhodesia, Angola, the Transvaal, and eastern Cape Colony. Thus in the north-east its range overlaps that of *S. aucupum nilotica*, and on the east and south to some extent with that of *S. aucupum obtusa*. It is possible that the two species have slightly different preferences as to haunts or food; but it is worth mentioning that at Tuandiva, in Mossamedes, Anson collected a male of each, both in breeding plumage, on the same day, March 16, 1906.

It will be noted that I have abandoned Cassin's name *verreauxii*,

which is a synonym of *paradisæa*. It is perfectly clear that it cannot be confused with *S. a. nilotica*, for I have examined Cassin's type of *verreauxii*, in the Philadelphia Academy. In case there may be any doubt as to the importance of the shape of the tail feathers, I may call attention to the fact that I have yet to see them of a shape intermediate between *aucupum* and *paradisæa*. Dr. A. G. Butler,¹ to be sure, does say that "The tail-plumes decrease in breadth, but increase in length with age." Fortunately he tells us just how much the increase was, 48 mm. in four annual molts; this is not as great as the variation I show for the subspecies of *aucupum*. If the shape of the feather-tip depended merely upon growth, then the *paradisæa* form should be found in northwest Africa. In other parts of the continent, where two forms do inhabit the same territory, one varies geographically, the other does not.

Nor it is probable that the two forms are Mendelian in character, interbreeding, yet preserving their distinctness. Far more probably the females will be found to show points of difference as well. In any event, the males in the eclipse plumage assumed each year do appear to be distinguishable. By comparing several specimens of *aucupum* in this plumage from Senegal and Zinder with others from parts of the continent where *paradisæa* alone has been found (southern Abyssinia especially), I found that *paradisæa* males in eclipse differ from those of *aucupum* in being generally darker above, the blackish markings predominating more over the rufous and buff. The light median crown-stripe is narrower in *paradisæa*, 4 mm. (as against 6-7.5 in *aucupum*), the black streaking on the back is much coarser, the upper tail coverts more blackish, and the middle pairs of rectrices apparently blacker and broader. The breast of *paradisæa* is even deeper cinnamon than that of *aucupum*, and it appears to be always more streaked. There are short triangular or arrow-shaped spots of blackish extending all across the chest.

This opinion as to the eclipse plumage of *paradisæa* is strengthened by Edwards' plate, which shows the same captive specimen of *paradisæa* in breeding and eclipse plumage. The spotted chest is very noticeable in the latter, whereas in undoubted males of *aucupum* there are only the faintest traces of spots. About the differences between females I cannot be so confident, but am inclined to think that here, too, *paradisæa* is more spotted on the chest. Most of the brown birds in collections are either females or young males, rarely adults in eclipse.

¹1894, 'Foreign Finches, in Captivity,' pp. 282, 283.

Now let us see whether any explanation can be offered for the origin and present distribution of these five forms of paradise whydah. I shall not attempt to offer final proof, but simply a plausible hypothesis. From what I know of these birds in the wild state, they abhor rain-forest. Living on grass seeds, burdened with enormous tail feathers during a large



Fig. 2. Approximate areas occupied by the subspecies of *Steganura aucupum*.

A.—*S. a. aucupum*; B.—*S. a. longicauda*; C.—*S. a. nilotica*; D.—*S. a. obtusa*. The ranges of the first three, however, will probably be found to meet in the region north of the Ubangi River.

part of the year, they are most at home in a short-grass plain, with a few trees as lookouts for the wary males. This is sufficient not only to show why they are found only in savannas and steppes, but even to give us a hint as to the probable inception of the two species. One cannot avoid being impressed by the importance of isolation in the past evolution of birds. This, more than any other influence, seems to have facilitated the origin of new forms, whether subspecies, species, or genera. I do not say "caused," for the cause may be something quite different.

The probable reason for the isolation of the paradise whydahs was the greater extension of the equatorial forest at some time in the past, in eastern Africa. Many botanists hold this to be extremely likely. It is my belief that *Steganura aucupum* was then restricted to the grasslands north of the forest, where it still monopolizes more than half the width of



Fig. 3. Approximate distribution of *Steganura paradisea*.

the continent, and that *S. paradisea* occupied those of the south. Then came the reduction of the forest to the east, but the two species were already so differentiated that when *aucupum* extended southward, and *paradisæa* northward into Abyssinia, they did not interbreed. There is no longer complete segregation, and yet we still see the same influences at work in the case of *S. aucupum*, with its widely scattered populations. They stretch over a vast area, and are still partially isolated by the Congo forests, with the result that slight differences in coloration, and in the dimensions of the wing and tail, have already begun to appear.

Steganura paradisæa is still homogeneous; even wing-length will not distinguish northeastern specimens from southern. A glance at the map will show how much less the Congo forest intercepts its distribution. If my assumption is correct, that *aucupum* and *paradisæa* no longer interbreed, it will be a good example of the slight external characters that suffice to hold allied species apart. Such differences in the shape of the tail may well have arisen by mutation, but their extension to a species as a whole must, I feel sure, be favored by this sort of isolation.

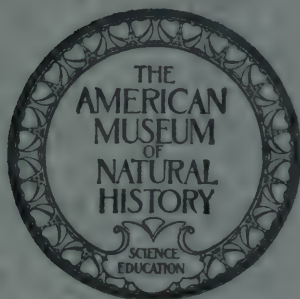
In some similar manner, in the more remote past, the related genera *Tetrænura*, *Linura*, and *Vidua* may have had their beginning, first as allied species—even now they are scarcely valid genera—under the influence of some condition affecting intercommunication. Once differences had been established that would forestall interbreeding, the birds might again spread into one another's areas. Why the stocks, once isolated, should tend to diverge is a question far beyond the scope of this paper; but I believe it to be the case.

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DESCRIPTION OF A NEW RACE OF THE LESSER BLACK-BACKED GULL, FROM THE AZORES

BY JONATHAN DWIGHT



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DESCRIPTION OF A NEW RACE OF THE LESSER BLACK-BACKED GULL, FROM THE AZORES

BY JONATHAN DWIGHT

A series of seventeen gulls from the Azores, recently acquired for The American Museum of Natural History, has been kindly placed at my disposal by Dr. L. C. Sanford. I am also indebted to Mr. Outram Bangs of the Museum of Comparative Zoölogy for the loan of two other gulls from the Canary Islands. These birds are strikingly different from any of the hitherto described races of *Larus fuscus* and, as the dates of capture range from August 22 to March 10, it is probable that they represent a form resident upon these islands and upon others off the African coast. For this reason I have named them after the fabled island or islands of Atlantis.

Larus fuscus atlantis, new subspecies

SUBSPECIFIC CHARACTERS.—Similar to *Larus fuscus affinis* but larger, the legs, feet and bill heavier, and the mantle a paler "light neutral" gray, instead of "deep neutral gray."

MEASUREMENTS.—Male: wing, 427; tail, 175; tarsus, 68; toe without claw, 58; claw, 10; culmen, 55; depth of bill at base, 19.5; at angle, 20.5.

TYPE.—No. 14304, collection of L. C. Sanford; ♂ ad.; March 10, 1922; Fayal Azores; J. G. Correia.

SPECIMENS EXAMINED

Larus fuscus atlantis, Azores, 8 ♂, 6 ♀, 3 juv.; Canary Islands, 1 ♂, 1 juv.

Larus fuscus fuscus, 6 ♂, 3 ♀, 2 juv.; 6 not sexed.

Larus fuscus affinis, 5 ♂, 4 ♀, 1 juv.; 5 not sexed.

Larus fuscus taimyrensis, 1 ♀.

Compared with *affinis*, the nearest race both in color and in distribution, the mantle of *atlantis* is a clearer, paler, bluer gray without any of the brownish tinge that marks all the other races even in perfectly fresh plumage, and, furthermore, when adult males are compared with males, and females with females, the average larger size is obvious.

Larus fuscus fuscus is a dark neutral gray often quite fuscous, browner with wear, almost as dark as *Larus marinus*; the race *affinis* is a deep neutral gray, very slightly brown-tinged, and of the same shade as *Larus occidentalis livens*; the race *taimyrensis* seems to be merely a large

affinis; while *atlantis* is the palest gray of any and similar in shade to *Larus occidentalis occidentalis*.

One may well wonder if this new race does not represent the birds that Godman years ago called *argentatus* in listing those of the Canaries and Madeira (Ibis, 1872, p. 222), having seen them in June on the Azores (Ibis, 1866, p. 103). Later writers have referred such birds to *cachinnans* (*leucophæus*), among them Ogilvie-Grant (Ibis, 1890, p. 444) and Lowe ('British Birds,' VI, 1912-13, p. 5); but without examination of actual specimens, I should be loth to exclude this species from the Atlantic fauna where it has been repeatedly recorded by a number of reliable observers.

Like *fuscus* and its races, *cachinnans* when adult has yellow feet, but the wing-pattern is quite different; *argentatus* and its races have flesh-colored feet, but again the wing-pattern is different from that of either *fuscus* or *cachinnans*. Those who have available specimens would do well to settle the question whether *cachinnans*, a species of more eastern distribution, breeds much west of the Black Sea region.

		Wing	Tail	Tarsus	Toe With- out Claw	Toe With Claw	Culmen	Bill Depth at Base	Bill Depth at Angle
Type No. 14304	♂	427	175	68	58	68	55	19.5	20.5
14305	♂	428	178	68	58	68	57	18	19
14307	♂	422	171	67	54	65	57	18.5	20
14306	♂	420	175	65	56	65	54	18.5	20.5
14309	♂	425	164	66	54	64	56	18	19
14308	♂	420	162	66	56	65	56	19	20
14310	♂	422	168	66	55	65	53	18	19.5
14311	♂	412	171	67	57	66	54	18	19
M. C. Z. No. 69036	♂	428	167	67	56	66	54	19.5	20.5
Average		422.7	169.8	66.6	56.0	65.8	55.1	18.5	19.8
14312	♀	406	165	66	53	60	54	18	19
14313	♀	405	164	61	52	61	48	17	18.5
14314	♀	398	164	60	51	59	49	16	18
Bewdoin College	♀	405	170	59	51	60	48	17	18
14315	♀	397	153	62	53	62	50	16.5	18
14316	♀	395	158	62	54	61	53	17	18
Average		401.0	162.3	61.7	52.3	60.5	50.3	16.9	18.3

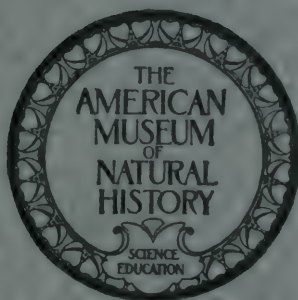
Specimen numbers refer to the collection of L. C. Sanford, except where otherwise noted. Measurements are in millimeters.

AMERICAN MUSEUM NOVITATES

No. 45

THE ANTS OF TRINIDAD

BY WILLIAM MORTON WHEELER



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THE ANTS OF TRINIDAD¹

BY WILLIAM MORTON WHEELER

Since the publication of my paper (Bull. Mus. Comp. Zool., LX, 1916, pp. 323-330, 1 fig.) on the ants collected in Trinidad by Prof. Roland Thaxter I have seen considerable additional material from the same locality. Dr. F. E. Lutz has recently sent me for study a series of specimens taken by Mr. P. B. Whelpley and contributed to The American Museum of Natural History, and Mr. F. W. Urich has sent me several interesting forms, among them a singular cave-ant which proves to belong to an undescribed genus. I have also found some species hitherto unrecorded from the island in a vial of miscellaneous sweepings received from Prof. Thaxter. During July 1920, while on my way to British Guiana, I was able, through the courtesy of Mr. W. G. Freeman, Director of Agriculture, Department of Trinidad and Tobago, to collect a number of species in the Botanical Garden near Port of Spain and at Caroni and Diego Martin. After studying this additional material it seems advisable to list the Formicidæ known to occur in the island. I have therefore included all the older records of species taken by Mr. Urich and Prof. Forel, who collected at Port of Spain while on his voyage to Colombia in 1896. The nearly 150 different forms taken to date furnish additional proof, if it were needed, that the ant fauna of Trinidad, unlike that of the various Windward Islands and Tobago, is in great part identical with and probably quite as rich as that of the adjacent Venezuelan coast.

FORMICIDÆ

Dorylinæ

Eciton burchelli Westwood.—Port of Spain, (R. Thaxter), ♂, ♀; Diego Martin, (Wheeler), ♂, ♀.

Eciton burchelli var. **urichi** Forel.—Trinidad, (Urich); Port of Spain, (R. Thaxter), ♂, ♀; Caparo and Port of Spain, (P. B. Whelpley), ♀.

Eciton (Labidus) crassicorne F. Smith.—Matura, (Urich); Port of Spain, (R. Thaxter); Caparo and Port of Spain, (P. B. Whelpley), ♀.

¹Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 207.

Eciton (Acamatus) pilosum F. Smith.—Aripa Savanna, (R. Thaxter); Port of Spain, (P. B. Whelpley), ♀.

Eciton (Acamatus) adnepos, new species¹

WORKER.—Length, 1.5–1.7 mm.

Practically monomorphic. Head subrectangular, nearly one-third longer than broad, slightly broader in front than behind, its sides very feebly and evenly convex, its posterior border broadly and deeply excised, its posterior corners rounded. Eyes represented by minute white spots at the middle of the sides. Mandibles short, narrow, their apical borders not very oblique, straight, somewhat acute at the tip but toothless. Clypeus very short and depressed, its anterior border very feebly sinuate in the middle. Antennæ stout, scapes reaching the middle of the head, incrassate apically; first funicular joint a little longer than broad, succeeding joints, especially the basal, strongly transverse, the ninth and tenth nearly as long as broad, the terminal twice as long as broad and blunt at the tip. The three last joints really form a club. Thorax narrow, laterally compressed; the pro- and mesonotum together three times as long as the base of the epinotum, very feebly and evenly convex, the pronotum with a strong transverse carina just behind the neck. Mesoëpinotal constriction feeble but distinct; epinotum small, its base, apart from the constriction, continuing the dorsal curve of the pro- and mesonotum and separated on each side from the short and concave declivity by a small angle; the sides of the declivity submarginate. Petiole about one and one-half times as long as broad, very convex above, with a large blunt protuberance at its anterior ventral end. Postpetiole slightly broader than long, but little broader than the petiole and less convex above, with a small, acute, transverse anteroventral projection. Gaster smaller than the head, elongate-elliptical. Legs rather stout; tarsal claws simple.

Very smooth and shining, except the meso- and metapleuræ which are very finely punctate and slightly opaque. Mandibles sparsely and finely punctate, piligerous punctures on the remainder of the body very minute and scattered.

Hairs pale yellow, uneven, rather short, coarse, moderately abundant, erect or suberect both on the body and appendages.

Head and thorax yellowish red; mandibles and meso- and metapleuræ darker; petiole, postpetiole, gaster, antennæ and legs yellow.

Described from 15 specimens taken from a small army which I found traversing the threshold of one of the fern-houses in the botanical garden at Port of Spain.

This minute species is quite distinct from any known to me in nature or from descriptions in the shape of the head, mandibles, pedicel, etc.

PONERINÆ

Platythyrea angusta Forel.—Trinidad (type-locality), ♀.

Prionopelta punctulata Mayr subsp. **antillana** Forel.—Savanna, (A. Forel), ♂.

¹Types of new species described in this paper will be deposited in The American Museum of Natural History.

- Ectatomma tuberculatum** Olivier.—Port of Spain and Sangre Grande, (R. Thaxter), ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.
- Ectatomma ruidum** Roger.—Port of Spain, (R. Thaxter), ♀; Chaguanas, (Urich), ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.
- Ectatomma (Gnamptogenys) concinnum** F. Smith.—Caparo, (P. B. Whelpley), ♀.
- Ectatomma (Holcaponera) brasiliense** Emery.—Port of Spain, (P. B. Whelpley), ♀.
- Ectatomma (Holcaponera) striatulum** Mayr var. **pleurodon** Emery.—Trinidad, (Urich), ♀.
- Neoponera obscuricornis** Emery var. **latreillei** Forel.—Caura, (Urich), ♀.
- Neoponera unidentata** Mayr.—Port of Spain, (R. Thaxter), ♀.
- Pachycondyla crassinoda** Latreille.—Port of Spain, (R. Thaxter), ♀, ♀; Caparo, (P. B. Whelpley), ♀.
- Pachycondyla harpax** Fabricius.—Port of Spain, (R. Thaxter), ♀.
- Pachycondyla impressa** Roger.—Port of Spain, (R. Thaxter), ♀; Botanical Garden, (Wheeler), ♀.
- Euponera (Mesoponera) constricta** Mayr.—Trinidad, (A. Forel), ♀; Port of Spain, (R. Thaxter), ♀, ♀; Montserrat, (Aug. Busck), ♀.
- Euponera (Mesoponera) lævigata** F. Smith variety **whelpleyi**, new variety
A single worker taken by P. B. Whelpley at Caparo seems to represent a distinct variety of this rare ant. Each side of the petiole has a large and conspicuous patch of parallel striæ like those on the sides of the epinotum but slanting from above downwards and backwards. I find no mention of these striæ in Smith's original description or in Emery's re-description of the typical form under the name of *Pachycondyla gogatina*.
- Euponera (Trachymesopus) stigma** Fabr.—Port of Spain, (R. Thaxter), ♀, ♀.
- Ponera opaciceps** Mayr.—Aripa Savanna, (R. Thaxter), ♀.
- Ponera trigona** Mayr var. **opacior** Forel.—Port of Spain, (R. Thaxter), ♀, in sweepings.
- Leptogenys unistimulosa** Roger var. **trinidadensis** Forel.—Trinidad, (Urich), type locality, ♀.
- Anochetus inermis** Ern. André.—Trinidad, (A. Forel), ♀, ♂.
- Anochetus inermis** var. **meinerti** Forel.—Chaguanas, (Urich), ♀; Port of Spain, (R. Thaxter), ♀, ♀, ♂.
- Anochetus targionii** Emery.—Caparo, (P. B. Whelpley), ♀.
- Anochetus (Stenomymex) emarginatus** Fabr.—Trinidad, (Urich), ♀; Port of Spain, (R. Thaxter), ♀; Ariopita Valley, (B. D. Chipman), ♀.

Odontomachus hæmatoda L.—Port of Spain, Gasparee Island and Sangre Grande, (R. Thaxter), ♂, ♀; Botanical Garden, Port of Spain, (Wheeler), ♂.

Odontomachus hæmatoda subsp. **insularis** Guérin var. **hirsutiusculus** F. Smith.—Port of Spain, (R. Thaxter), ♂.

Odontomachus hæmatoda L. subsp. **meinerti** Forel.—Port of Spain, (R. Thaxter), ♂.

Pseudomyrminae

Pseudomyrma championi Forel var. **paulina** Forel.—Port of Spain, (Aug. Busck; R. Thaxter), ♂.

Pseudomyrma elegans F. Smith subsp. **breviceps** Forel.—Savanna, (A. Forel), type-locality, ♂; Trinidad, (A. Busck), ♂; Botanical Garden, Port of Spain, (Wheeler), ♂.

Pseudomyrma elongata Mayr.—Trinidad, (A. Forel), ♂; Port of Spain, (P. B. Whelpley), ♂.

Pseudomyrma flavidula F. Smith.—Port of Spain, (P. B. Whelpley), ♂.

Pseudomyrma gracilis Fabr.—Port of Spain, (P. B. Whelpley), ♂; Botanical Garden, Port of Spain, (Wheeler), ♂.

Pseudomyrma culmicola Forel.—Trinidad, (A. Forel), type-locality, ♂.

Pseudomyrma excavata Mayr.—Port of Spain, (R. Thaxter), ♂; Botanical Garden, Port of Spain, (Wheeler), ♂.

Pseudomyrma filiformis Fabr.—Trinidad, (Urich), ♂.

Pseudomyrma kuenckeli Emery.—Trinidad, (Urich); Botanical Garden, Port of Spain, (Wheeler), ♀.

Pseudomyrma nigropilosa Emery subsp. **laticeps** Forel.—Trinidad, (A. Forel), type-locality, ♂.

Pseudomyrma pallida F. Smith.—Aripa Savanna, (R. Thaxter), ♂; Trinidad, (Urich), ♂.

Pseudomyrma icterica, new species

WORKER.—Length, nearly 6 mm.

Head subrectangular, about one-fifth longer than broad, as broad in front as behind, with feebly convex sides and feebly and broadly excised posterior border; in profile convex above and below. Mandibles moderately convex, with two larger apical and several minute basal teeth. Clypeus bluntly carinate behind, its border broadly sinuate on each side, with a distinct rectangular lobe, rounded at the corners. Frontal carinae small, closely approximated; frontal groove feeble. Eyes moderately large and convex, about two-fifths the length of the sides of the head. Antennal scapes reaching the middle of the head; first funicular joint a little longer than broad, second broader than long, remaining joints slightly longer than broad, terminal joint longer. Thorax rather narrow; the pro- and mesonotum together a little longer than the epinotum; the mesoepinotal constriction abrupt, rather long and deep, its im-

pressed surface longitudinally striated. Pronotum as long as broad, with rather flattened sides, rounded above and at the humeri. Mesonotum semicircular, broader than long. Epinotum with the base sloping backward, twice the length of the declivity into which it passes through a rounded obtuse angle. Petiole stout, with short peduncle and thick node, the latter rising rather abruptly in front. Seen from above it is as broad as long, with rounded sides and posterior border and straight anterior border; the sides almost submarginate, the ventral surface with a very small acute, downwardly directed spine near its anterior end. Postpetiole nearly a third again as broad as the petiole, broader than long, narrowed and constricted anteriorly, its sides posteriorly and its dorsal surface convex and rounded. Gaster rather large, of the usual shape. Fore femora dilated and somewhat flattened and rhomboidal; hind femora somewhat swollen.

Mandibles opaque, striatopunctate apically, smoother at the base; remainder of the body smooth and shining; anterior half of head finely and rather densely punctate and subopaque, punctures on the remainder of the body sparse and very fine.

Hairs pale yellow, very sparse, erect, rather evenly scattered over the head, thorax and abdomen; pubescence very fine and dense on the gaster but apparently lacking elsewhere.

Yellow; teeth and borders of mandibles, postpetiole, and gaster, except at last segment, brown; the second and third segments of the gaster darker. Legs somewhat paler than the head and thorax.

A single specimen taken by Mr. August Busek at Port of Spain. I describe this and the following species as new because they are distinctly different from any of the forms of which I have seen specimens or descriptions.

***Pseudomyrma auripes*, new species**

FEMALE (deälated).—Length, about 8 mm.

Head subrectangular, about one-sixth longer than broad, slightly narrowed in front, with rounded sides and posterior corners and nearly straight posterior border, in profile somewhat flattened in the frontal region. Mandibles stout, flattened, with a pronounced protuberance, or knee, in the outer border near the base; apical border with two strong terminal and no basal teeth. Clypeus carinate in the middle, broadly notched on each side, the median lobe long and narrow with acute corners. Frontal carinae rather long and not closely approximated; frontal groove very fine and indistinct. Eyes rather flat, only about one-third as long as the sides of the head. Antennal scapes short, thickened distally, reaching only to the margins of the cheeks when placed transversely; first funicular joint one and one-half times as long as broad, remaining joints, except the last, twice as broad as long, except the second joint which is less abbreviated. Thorax long, narrower through the wing-insertions than the head. Epinotum in profile with the base but little longer than the declivity. Petiole short, scarcely twice as long as broad, the peduncle very indistinct, the node evenly rounded, broadest just behind the middle, bluntly submarginate above on the sides below and anteriorly with a large, flattened, hook-like, downwardly and backwardly directed spine. Postpetiole about one-fourth broader than the petiole, broader than long, hemispherical, not constricted anteriorly but evenly convex and rounded dorsally and laterally. Its ventral surface is also convex and bears a small,

acute tooth at the anterior end. Gaster elongate, the pygidium pointed, the hypopygium laterally compressed. Legs stout.

Smooth and shining; the mandibles coarsely rugose-punctate. Anterior portion of head very finely and superficially, the remainder of the body much more sparsely punctate.

Hairs pale yellowish, pubescence whitish; the former sparse and erect, short on the head, longer and more abundant on the pedicel and gaster. Pubescence very dilute and indistinct, except on the sides of the epinotum where it is sufficiently dense to give the surface a pruinose appearance.

Black; mandibles, sides of clypeus and borders of cheeks castaneous; antennæ, wing-insertions, tips of femora, tibiæ, tarsi, spine on ventral surface of petiole, and ventral and lateral borders of gastric segments, yellow; antennal scapes and median portions of middle and hind tibiæ brown.

Described from a single specimen which I found running on a tree-trunk in the Botanical Garden near Port of Spain. This species is apparently related to the series of plant-inhabiting *Pseudomyrmas* comprising *Ps. arboris-sanctæ* Emery, *latinoda* Mayr, *tachigaliæ* Forel, *damnosa* Wheeler, *tripilaridis* Forel, etc.

Myrmicinæ

Pheidole biconstricta Mayr subsp. **socrates** Forel.—Trinidad, (Urich),
♂, ♀.

Pheidole cornutula Emery.—Botanical Garden, Port of Spain, (Wheeler),
♂.

Pheidole subarmata Mayr var. **borinquenensis** Wheeler.—Botanical Garden, Port of Spain, (Wheeler), ♂.

Pheidole fallax Mayr subsp. **jelskii** Mayr.—Trinidad, (Urich, Forel),
♂, ♀.

Pheidole fallax subsp. **jelskii** Mayr var. **antillensis** Forel.—Botanical Garden, Port of Spain, (Wheeler), ♂, ♀.

Pheidole flavens Roger subsp. **gracilior** Forel.—Trinidad, (A. Forel),
♂, ♀.

Pheidole flavens subsp. **sculptior** Forel.—Trinidad, (Urich), ♂, ♀.

Pheidole susannæ Forel subsp. **obscurior** Forel.—Trinidad, (A. Forel).

Pheidole lacerta, new species

SOLDIER.—Length, 2.3 mm.

Closely related to *Ph. licornis* Forel of Panama. Head about one-fifth longer than broad, as broad in front as behind, its anterior angles small and very acute, the sides feebly convex, the posterior border rather deeply excised, but the occipital groove short and shallow; the frontal groove absent. Eyes rather small and feebly convex, at the anterior fourth of the sides. Gula in front with two prominent teeth. Mandibles not very convex, with two larger apical and two minute basal teeth. Clypeus short, concave and ecarinate, its anterior border nearly straight in the middle. Frontal carinae large, suberect and prominent, but not acute, forming the inner borders of distinct, though flattened scrobe-like depressions. Antennæ small and slender;

scapes not incrassated and not reaching to the middle of the sides of the head; club as long as the remainder of the funiculus; joints 2-8 very short, transverse and subequal. Pro- and mesonotum together forming a subhemispherical mass with indistinct humeri; the declivity of the mesonotum with a very feeble indication of a transverse torus behind; mesoëpinal constriction pronounced. Epinotum small, longer than broad, the base in profile horizontal and distinctly longer than the sloping declivity, the spines short and acute, directed upward and outward and slightly backward. Petiole from above scarcely broader behind than in front, the node with a transverse, entire border. Postpetiole about half again as broad as the petiole, broader than long and broadest in front where its sides are bluntly angular. Gaster elongate-elliptical, as large as the head. Legs rather short and not very robust.

Mandibles and clypeus smooth and shining, the former with small scattered, elongate punctures. Head and thorax subopaque, the head transversely rugose above, more reticulate-rugose laterally and in the occipital region, the scrobes finely and densely punctate. The gula is also reticulate but more loosely and finely and its sides are smooth and shining. Thorax and petiole very finely and densely punctate, the pronotum also transversely rugulose above. Postpetiole, gaster and legs smooth and shining, with fine, sparse, piliferous punctures.

Hairs yellowish, delicate, short and suberect on the head and moderately abundant, erect and much longer on the thorax, pedicel and gaster, very short and appressed on the appendages.

Ferruginous red; antennæ and legs yellow.

A single specimen swept from foliage near Port of Spain by Prof. Roland Thaxter.

This species, though closely related to *Ph. bicornis* Forel, seems, nevertheless, to be sufficiently distinct. The Central American species is considerably larger (3.2-3.3 mm.), its clypeus is carinate, its frontal carinæ are pointed as in *Ph. cornutula*, the humeri of the pronotum are more pronounced, the petiolar node is emarginate at the summit, the sculpture is coarser, especially on the thorax, and the color is paler.

***Pheidole tenerescens*, new species**

SOLDIER.—Length, 2.2 mm.

Allied to *Ph. minutula* Mayr. Head large, rectangular, scarcely longer than broad, as broad in front as behind, with straight, parallel sides, the posterior border somewhat more deeply excised than in *minutula*, the dorsal and gular surfaces decidedly less convex. Occipital groove very short and shallow; frontal groove absent. Gula anteriorly with two small, acute teeth. Mandibles convex, with two distinct apical teeth. Clypeus moderately convex in the middle but ecarinate, the anterior border straight. Eyes small and rather flat, nearly circular, near the anterior fourth of the head. Frontal area large, shallow, subelliptical. Frontal carinæ short, diverging. There are no scrobes nor scrobe-like depressions for the antennæ. The latter are slender; scapes reaching nearly to the middle of the sides of the head; the funiculi long, the club as long as the remainder of the funiculus, joints 2-8 small, distinctly shorter than long. Thorax shaped much as in *minutula*; the pro- and mesonotum together forming a large hemispherical mass, with distinct though blunt humeral angles; the mesonotum descending behind abruptly to the mesoëpinal

constriction. Epinotum subcuboidal, as broad as long, its base as long as the declivity, the spines small, short and acute, directed upward, not half as long as the distance between their bases. Petiole small, less than twice as long as broad, the node blunt and rounded, not compressed anteroposteriorly. Postpetiole scarcely broader than the petiole, a little broader than long, its sides and dorsal surface rounded. Gaster smaller than the head, broadly elliptical. Legs rather short.

Smooth and shining; the anterior half of the head longitudinally rugulose, the rugules being faint and not very dense; the posterior half of the head with very sparse, piligerous punctures. Epinotum superficially and densely punctate or finely reticulate.

Hairs white, very fine, rather short, suberect, moderately abundant on the body, finer and more appressed on the legs; scapes with a few erect longer hairs on their anterior surfaces.

Honey-yellow; head and mandibles a little darker.

A single specimen taken by Prof. Thaxter near Port of Spain in sweepings.

This form is sufficiently distinct from *Ph. minutula* in the more flattened and much more feebly sculptured head, the smaller eyes, less compressed petiolar node, shorter and sparser pilosity, paler coloration, etc.

Pheidole (Macropheidole) fimbriata Roger.—Port of Spain, (R. Thaxter), ♂, ♀; Caparo, (P. B. Whelpley), ♂, ♀, ♀.

Pheidole (Decapheidole) decem Forel.—Trinidad, (A. Forel), type-locality, ♂.

Crematogaster brevispinosa Mayr var. **minutior** Forel.—Botanical Garden, Port of Spain, (Wheeler), ♀. Nesting in accumulations of carton around spines of two trees of *Acacia cornigera*.

Crematogaster (Orthocrema) brasiliensis Mayr.—Aripa Savanna and Sangre Grande, (R. Thaxter), ♀.

Crematogaster (Orthocrema) limata F. Smith.—Port of Spain, (R. Thaxter), ♀, in sweepings.

Crematogaster (Orthocrema) limata subsp. **parabiotica** Forel.—Trinidad, (Urich), ♀; Port of Spain and Gasparée Island, (R. Thaxter), ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.

Monomorium floricola Jerdon.—Trinidad, (Urich), ♀; Port of Spain, (R. Thaxter), ♀.

Magalomyrmex bituberculatus Forel.—Arima, (Urich), ♀; Port of Spain, (R. Thaxter), ♀.

Tranopelta gilva Mayr.—Port of Spain, (Aug. Busck), ♀ ♂.

Solenopsis albinodis Forel.—Trinidad, (Urich), ♀; Port of Spain, (R. Thaxter), ♀, in sweepings.

Solenopsis basalis Forel var. **urichi** Forel.—Trinidad, (Urich), type-locality, ♀, ♀.

Solenopsis tenuis Mayr.—Port of Spain, (R. Thaxter), ♂.

Solenopsis minutissima Emery.—Trinidad, (R. Thaxter), ♂.

Solenopsis geminata Fabr.—Port of Spain, (R. Thaxter), ♂; Chaguanas (Urich), ♂; Port of Spain, (P. B. Whelpley), ♂; Botanical Garden, Port of Spain, (Wheeler), ♂.

SPELÆOMYRMEX, new genus

WORKER.—Very small, monomorphic. Head moderately large, with convex sides and concave posterior border. Mandibles narrow, their apical borders very oblique, with a few large teeth. Clypeus very short, except in the middle, where it extends back between the frontal carinæ, the anterior border sinuous in the middle and on each side with a broad tooth, and with two carinæ which curve outwards anteriorly and form sharp borders for the antennal sockets. Frontal groove and area absent; frontal carinæ small, short and lobular. Eyes minute, in front of the middle of the head; ocelli absent. Antennæ 11-jointed, the funiculi with a very distinct 2-jointed club, as long as the remainder of the funiculus, the terminal joint very long, the first joint also long and stout compared with joints 2-8, which are small and shorter than broad. Thorax rather slender, with very distinct mesoëpinotal constriction, angular humeri and the epinotum armed with spines. There is no promesonotal suture. Petiole small, elongate, pedunculate, with a conical node, the ventral surface unarmed. Postpetiole with a very low node. Gaster much smaller than the head, the first segment very large, truncated anteriorly, the remaining segments small and short. Legs long, the femora and tibiæ slender basally, clavate distally, the middle and hind tibiæ without spurs; tarsal claws simple.

GENOTYPE.—*S. urichi*, new species.

Spelæomyrmex urichi, new species

Figure 1

WORKER.—Length, 1.5 mm.

Head scarcely longer than broad, as broad in front as behind, with evenly convex sides and broadly excised posterior border; in profile somewhat more flattened above than below. Mandibles moderately large, with convex external borders and the oblique apical borders furnished with four large, subequal teeth. Clypeus steep and convex in the middle, depressed on the sides. Eyes consisting of only a few minute, indistinct, pigmented facets, placed at the anterior third of the head. Antennæ rather long, their scapes reaching to about half the distance between the eyes and the posterior corners of the head. Basal joint of the funiculus fully twice as long as broad and much longer than joints 2-7, which are fully twice as broad as long, the eighth joint nearly as long as broad; basal joint of club longer than broad, terminal joint three times as long as the basal and rather pointed at the tip. Thorax much narrower than the head, the pro- and mesonotum depressed and very feebly rounded above in profile, the humeri distinctly angular, the inferior angles of the pronotum blunt. Mesoëpinotal constriction abrupt and rather long. Epinotum much narrower than the pronotum, subrectangular, broader than long, its base longer than broad, the spines flattened, triangular, somewhat longer than broad, acute, shorter than their distance apart at the base and directed upward and backward. Petiole twice as long as broad, broadened behind, the conical node circular when seen from above and rising rather abruptly from the peduncle, the ventral surface of the segment feebly

convex anteriorly. Postpetiole in profile but little more convex dorsally than ventrally, from above trapezoidal, about twice as broad behind as in front, with straight anterior, posterior and lateral borders. Gaster elliptical, its anterior border straight and transverse, angulate at the sides. Basal halves of femora slender, apical halves incrassated; tibiae, especially the middle and hind pairs, of similar shape.

Subopaque; mandibles coarsely rugose-punctate; sides of clypeus and the cheeks longitudinally rugose; remainder of head, thorax, petiole, and postpetiole reticulate-rugose; middle of clypeus, a large, elongate area just behind the frontal

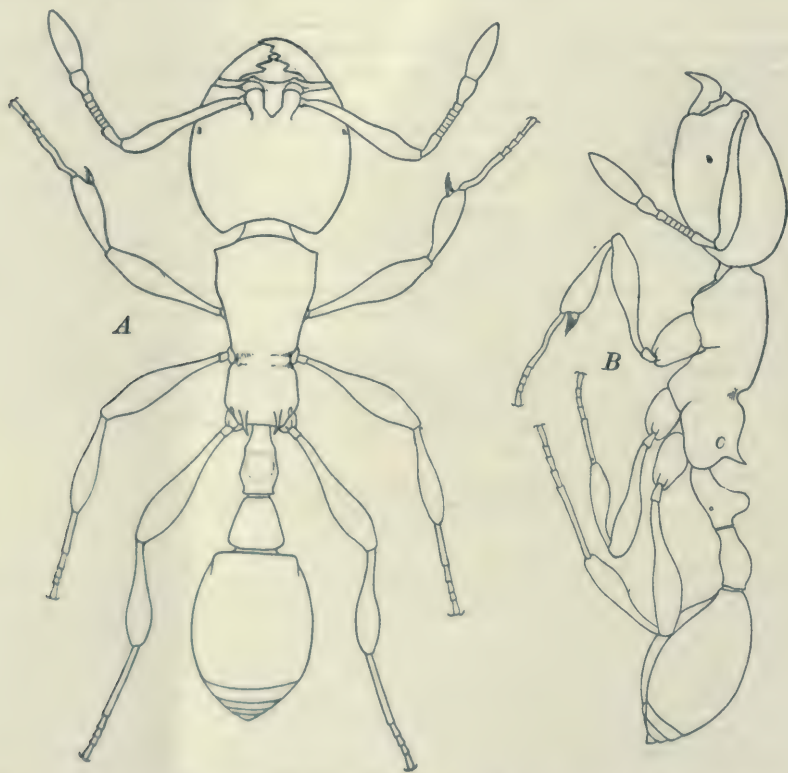


Fig. 1. *Spelzomyrmex urichi*, new genus and new species. Worker. A, dorsal; B, lateral aspect.

carinae, the nodes of the petiole and postpetiole, the gaster and appendages very smooth and shining, with minute, sparse, piligerous punctures. The meshes of the reticulation on the postero-lateral portions of the head and on the pronotum are looser and more longitudinal than on the epinotum and the ventral portions of the petiole and postpetiole.

Hairs pale yellowish, bristly, erect, rather abundant, uneven, covering the body and appendages, conspicuously long on the clypeus, legs, gaster and nodes of petiole and postpetiole. Pubescence absent.

Ferruginous; the antennae, legs, gaster and nodes of the petiole and postpetiole yellow.

Described from eleven specimens found by Mr. F. M. Urich living in the guano of the fat-bird (*Steatornis caripensis* Humboldt) in the Guacharo Cave of Trinidad. The pale color, very minute eyes and long bristly pilosity indicate that this is a true cavernicolous ant. It evidently runs down to the tribe Pheidologetini Emery in our tables and is very closely related to *Erebomyrma* Wheeler, but differs markedly in a number of characters, notably in the much larger size of the head, the angulate humeri, the shape of the petiole, postpetiole and legs and the much greater size of the first gastric segment. The discovery of the probably very large male and female phases will probably show that we are concerned either with a very distinct genus or a highly aberrant species of *Erebomyrma*. Perhaps the Texan *E. longi* Wheeler, which is certainly subterranean and has been taken only once (during a nuptial flight), is really a cavernicolous ant. At any rate search should now be made for it in the bat-guano which often accumulates in great masses in many of the caves of Texas.

Leptothorax (Goniothorax) asper Mayr.—Port of Spain, (P. B. Whelpley), ♀.

Leptothorax (Goniothorax) tristani Emery.—Port of Spain, (R. Thaxter), ♀, in sweepings.

Wasmannia auropunctata Roger.—Trinidad, (A. Forel), ♀, ♂; Port of Spain, (R. Thaxter), ♀, ♀; Botanical Garden, Port of Spain, (Wheeler), ♀; Guacharo Cave, (Urich), in nesting materials of guacharo (*Steatornis caripensis* Humb.), ♀.

Procryptocerus spiniperdus Forel.—Trinidad, (Urich), type-locality, ♀; Port of Spain, (P. B. Whelpley), ♀, ♀.

The female measures nearly 7 mm. and is very similar to the worker but with the pronotum coarsely and evenly reticulate-rugose and the longitudinal rugae on the mesonotum and base of epinotum coarser. The epinotal spines are stouter and proportionally shorter.

Cryptocerus maculatus F. Smith.—Trinidad, (R. Thaxter), ♀.

Cryptocerus maculatus subsp. **nanus** Forel.—Savanna, (A. Forel) type-locality, ♀; Port of Spain, (P. B. Whelpley), ♀; same locality (R. Thaxter), ♀, in sweepings.

Cryptocerus umbraculatus Fabr.—Port of Spain, (P. B. Whelpley), ♀.

Cryptocerus pusillus Klug.—Aripa Savanna, (R. Thaxter), ♀.

Cryptocerus spinosus Mayr.—Botanical Garden, Port of Spain, (Wheeler), ♀.

Cryptocerus (Zacryptocerus) clypeatus Fabr.—Sangre Grande, (R. Thaxter), ♀; Port of Spain, (U. S. Nat. Mus.), ♀.

Cephalotes atratus L.—Trinidad, (A. Forel), ♀; Port of Spain, (R. Thaxter, P. B. Whelpley, Wheeler), ♀.

Strumigenys eggersi Emery.—Verdant Vale, (Urich), ♀; Port of Spain, (R. Thaxter), ♀, in sweepings.

Strumigenys saliens Mayr.—Port of Spain, (R. Thaxter), ♀.

Strumigenys trinidadensis, new species

WORKER.—Length, nearly 3 mm.

Closely related to *S. saliens* Mayr but smaller. Head and mandibles of the same shape and proportions but the occipital excision deeper and the mandibles flatter. The teeth are of the same number and in the same position but differ in length; the denticle at the base of the apical tooth is much smaller and the two on the inner border of the mandibles are very short and acute, the proximal shorter than the distal. Antennal scapes slender, reaching to the beginning of the occipital lobes as in *saliens*; first funicular joint as long as joints 2 and 3 together, which are subequal and distinctly longer than broad; joint 4 nearly as long as joints 1 to 3 together and scarcely more than half as long as the terminal joint. Thorax shaped as in *saliens*, but pro- and mesonotum with a slender, sharp median carina. Epinotum with both superior and metasternal spines, the former somewhat longer than the latter and about half as long as the base of the epinotum, without membranous expansion below. Petiole and postpetiole similar to those of *saliens* but the peduncle of the former passing much more gradually into the distinctly lower node. Postpetiole broader than in *saliens*, being nearly twice as broad as the petiolar node. The spongi-form masses arranged much as in *saliens* but less developed along the ventral surface of the petiole.

Opaque; finely and densely punctate, postpetiole and ventral and apical portions of the gaster smoother and more shining; head more coarsely, pronotum more finely rugose, the rugæ irregular and longitudinal. Gaster very finely and indistinctly shagreened, its extreme base with a regular row of radiating rugules.

Hairs whitish; those on the anterior border of scapes curved and clavate and in a regular series. There are a few erect clavate hairs on the head and thorax and the head has also more numerous small, scattered appressed and rather indistinct scale-like hairs; those on the petiole, postpetiole and gaster are fine, long, erect, abundant and flexuous; mandibles and legs with short, delicate, appressed hairs.

Yellowish brown; mandibles, legs and gaster more yellowish; the teeth on the inner borders of the mandibles black.

Described from a single specimen swept from foliage near Port of Spain by Prof. Roland Thaxter.

This ant is readily distinguished from *S. saliens* by its considerably smaller size, paler color, shorter mandibular teeth, carinate pro- and mesonotum, more finely punctate and more coarsely rugose head and pronotum, lower petiolar node and different abdominal pilosity. It is less closely related to *S. silvestrii* Emery, which is much smaller, paler, with much less deeply excised head and lacks the metasternal spines, though the arrangement of the mandibular teeth is similar.

- Codiomyrmex thaxteri** Wheeler.—Port of Spain, (R. Thaxter), type-locality, ♀, in sweepings.
- Sericomyrmex urichi** Forel.—Trinidad, (Urich), type-locality, ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.
- Apterostigma mayri** Forel.—Trinidad, (Urich), type-locality, ♀; Diego Martin, (Wheeler), ♀, ♀, ♂, fungus gardens under logs in cacao plantation.
- Apterostigma urichi** Forel.—Trinidad, (Urich), type-locality, ♀; Caparo, (R. Thaxter), ♀.
- Apterostigma wasmanni** Forel.—Four Roads, Port of Spain, (R. Thaxter), ♀.
- Myrmicocrypta squamosa** F. Smith.—Port of Spain, (A. Forel), ♂.
- Mycocepurus smithi** Forel.—Diego Martin, (Urich), ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.
- Cyphomyrmex rimosus** Spinola.—Botanical Garden, Port of Spain, (Wheeler), ♀, ♀, ♂.
- Cyphomyrmex rimosus** subsp. *minutus* Mayr.—Botanical Garden, Port of Spain, (Wheeler), ♀.

Trachymyrmex cornetzi Forel variety *bivittatus*, new variety

WORKER.—Differing from the typical form from Colombia in having the pale-brownish cloud on each side of the first gastric segment replaced by a very definite dark-brown band, which reaches to the base of the segment and is continued as a band of the same color on the side of the postpetiole. There is no infuscation of the pronotum, but the antennal club, except the tip of its last joint, is dark brown.

Numerous workers from two colonies which I found in the Botanical Garden, Port of Spain (type-locality) and at Coroni. In both places the nests were in clay banks and resembled those of our North American *T. septentrionalis* McCook. I have taken the typical *cornetzi* at Kartabo in British Guiana. Forel has described from Colombia a variety, *naranjo*, which is more reddish and with an even feebler development of the brown clouded areas than in the typical form of the species.

- Trachymyrmex humilis** Wheeler.—Gaspree Island and Port of Spain, (R. Thaxter), type-locality, ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.
- Trachymyrmex urichi** Forel.—Trinidad, (Urich), type-locality, ♀; Ariopita Valley, (B. D. Chipman), ♀; Gaspree Island, (R. Thaxter), ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.
- Acromyrmex octospinosus** Reich.—Trinidad, (Günther, Urich, A. Forel), ♀, ♀, ♂; Gaspree Island, (R. Thaxter), ♀; Ariopita Valley, (B. D. Chipman), ♀; Port of Spain, (P. B. Whelpley), ♀; Botanical Garden, Port of Spain, (Wheeler), ♀.

Atta cephalotes L.—Port of Spain and Sewa Valley, (R. Thaxter), ♂; Taberguilla and Port of Spain, (P. B. Whelpley), ♂.

Dolichoderinæ

Dolichoderus attelaboides Fabr.—Arima, (Urich), ♂; Port of Spain, (R. Thaxter), ♂.

Dolichoderus decollatus F. Smith.—Port of Spain, (R. Thaxter), ♂.

Dolichoderus (Monacis) bispinosus Olivier.—Port of Spain, (R. Thaxter), ♂, ♀, ♂; Erin, (Urich), ♂; Caparo, (P. B. Whelpley), ♂; Caroni and Botanical Garden, Port of Spain, (Wheeler), ♂.

Dolichoderus (Monacis) debilis Emery.—Matura, (Urich), ♂; Sangre Grande, (R. Thaxter), ♂.

Dolichoderus (Hypoclinea) bidens L.—Tamana, (Urich), ♂; Botanical Garden, Port of Spain, (Wheeler), ♂.

Dolichoderus (Hypoclinea) bidens var. **spurius** Forel.—Trinidad, (Urich), type-locality, ♂.

Dolichoderus (Hypoclinea) championi Forel var. **tæniatus** Forel.—Savanna, (A. Forel), Port of Spain, (R. Thaxter), ♂; Botanical Garden, Port of Spain, (Wheeler), ♂.

Dolichoderus (Hypoclinea) championi subsp. **trinidadensis** Forel.—Trinidad, (Urich), type-locality, ♂; Port of Spain, (R. Thaxter), ♂.

Dolichoderus (Hypoclinea) lutosus F. Smith.—Savanna, (A. Forel), ♂.

Iridomyrmex dispartitus Forel subsp. **micans** Forel.—Port of Spain, (R. Thaxter), ♂.

Azteca alfaroi Emery subsp. **lucidula** Forel.—Trinidad, (Urich), ♂, ♀, ♂; Caroni and Botanical Garden, Port of Spain, (Wheeler), ♂, ♀, in internodes of *Cecropia peltata*.

Azteca barbifex Forel.—Port of Spain, (R. Thaxter), ♂.

Azteca bicolor Emery subsp. **belti** Emery.—Botanical Garden, Port of Spain, (Wheeler), ♂, running on trunks of *Cecropia peltata*.

Azteca chartifex Forel.—Trinidad, (Urich), type-locality, ♂; Arima, (Urich).

Azteca chartifex subsp. **decipiens** Forel var. **lanians** Forel.—Arima, (Urich), ♂, ♀; Botanical Garden, Port of Spain, (Wheeler), ♂, from large, pendent, carton nests on rubber trees.

Azteca constructor Emery.—Botanical Garden, Port of Spain, (Wheeler), ♂, ♀, nesting in internodes of *Cecropia peltata*.

Azteca delpini Forel subsp. **trinidadensis** Forel.—Trinidad, (Urich), type-locality, ♂, ♀; Caroni, (Wheeler), nesting in internodes of *Cecropia peltata*.

- Azteca foreli** Emery subsp. **ursina** Forel.—Trinidad, (Urich), type-locality, ♀, ♂; Chatham, (Urich), ♀.
- Azteca jelskii** Emery.—Trinidad, (Urich), ♀, ♀.
- Azteca trigona** Emery subsp. **mathildæ** Forel var. **spuria** Forel.—Botanical Garden, Port of Spain, (Wheeler), ♀.
- Azteca trigona** subsp. **mediops** Forel.—Port of Spain, (R. Thaxter), ♀; Ariopita Valley, (H. D. Chapman), ♀.
- Azteca velox** Forel.—Arima, (Urich), ♀.
- Azteca velox** Forel var. **nigriventris** Forel.—Port of Spain, (R. Thaxter), ♀.
- Azteca xanthochroa** Roger.—Caroni, (Wheeler), ♀, nesting in internodes of *Cecropia peltata*.
- Tapinoma melanocephalum** Fabr.—Aripa Savanna, (R. Thaxter), ♀; Port of Spain, (P. B. Whelpley), ♀.
- Tapinoma ramulorum** Emery var. **saga** Forel.—Trinidad, (Urich), type-locality, ♀, ♀.
- Tapinoma ramulorum** subsp. **irrectum** Forel var. **cearense** Forel.—Trinidad, (Urich), ♀, ♂.

Formicinæ

- Brachymyrmex heeri** Forel.—Port of Spain, (R. Thaxter), ♀, in sweepings.
- Brachymyrmex minutus** Forel.—Trinidad, (Urich), ♀.
- Prenolepis (Nylanderia) longicornis** Latr.—Sangre Grande, (R. Thaxter), ♀.
- Prenolepis (Nylanderia) cæciliæ** Forel.—Caparo, (P. B. Whelpley), ♀.
- Prenolepis (Nylanderia) steinheili** Forel.—Port of Spain, (P. B. Whelpley), ♀.
- Prenolepis (Nylanderia) vividula** Nyl.—Port of Spain, (R. Thaxter), ♀.
- Prenolepis (Nylanderia) vividula** subsp. **guatemalensis** Forel var. **itinerans** Forel.—Trinidad, (Urich), ♀.
- Camponotus (Dinomyrmex) agra** F. Smith.—Platanal, (Urich), ♀; Caparo, (P. B. Whelpley), ♀.
- Camponotus (Myrmothrix) abdominalis** Fabr.—Trinidad, (A. Forel); Port of Spain, (R. Thaxter, P. B. Whelpley), ♀; Ariopita Valley, (B. D. Chipman), ♀; Botanical Garden, Port of Spain, (Wheeler), ♀, ♀.
- Camponotus (Myrmothrix) femoratus** Fabr.—Port of Spain, (R. Thaxter), ♀.
- Camponotus (Myrmosphincta) urichi** Forel.—Trinidad, (Urich), type locality, ♀.

Camponotus (Myrmobrachys) auricomus Roger.—Botanical Garden, Port of Spain, (Wheeler), ♀.

Camponotus (Myrmobrachys) beebei Wheeler.—Near Port of Spain, (R. Thaxter), ♀.

Camponotus (Myrmobrachys) brettessi Forel.—Trinidad, (A. Forel), ♀.

Camponotus (Myrmobrachys) canescens Mayr.—Botanical Garden, Port of Spain, (Wheeler), ♀.

Camponotus (Myrmobrachys) excisus Mayr.—Port of Spain, (R. Thaxter), ♀.

Camponotus (Myrmobrachys) godmani Forel variety **palliolatus**, new variety

Six minor workers taken near Port of Spain by Prof. R. Thaxter agree closely with Forel's description of the types from Mexico and Central America, except that the tibiae, upper surfaces of the femora and upper surface of the thorax are dark brown; the pigment on the pronotum being aggregated in two large, rather indefinite spots. The posterior portion of the head seems also to be more extensively infuscated than in the typical form.

Camponotus (Myrmobrachys) lindigi Mayr.—Gasperee Island, (R. Thaxter), ♀.

Camponotus (Myrmobrachys) senex F. Smith.—Port of Spain, (R. Thaxter, P. B. Whelpley), ♀.

Camponotus (Myrmobrachys) zoc Forel.—Trinidad, (A. Forel); Ariopita Valley, (B. D. Chipman), ♀.

Camponotus (Myrmamblys) novogrenadensis Mayr.—Botanical Garden, Port of Spain, (Wheeler), ♀.

Camponotus (Myrmocladæcus) rectangularis Emery var. **setipes** Forel, —Trinidad, (Urich), type-locality, ♀.

Camponotus (Myrmocladæcus) latangulus Roger.—Port of Spain, (R. Thaxter), ♀.

Camponotus (Myrmocladæcus) bidens Mayr.—Port of Spain, (R. Thaxter), ♀.

Camponotus (Pseudocolobopsis) claviscapus Forel.—Trinidad, (Urich), type-locality, ♀, ♂.

AMERICAN MUSEUM NOVITATES

No. 46

A NEW GENUS AND SUBGENUS OF MYRMICINÆ FROM TROPICAL AMERICA

BY WILLIAM MORTON WHEELER

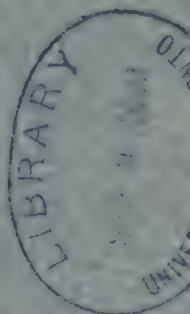


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Number 46

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A NEW GENUS AND SUBGENUS OF MYRMICINÆ FROM TROPICAL AMERICA¹

BY WILLIAM MORTON WHEELER

MYRMECINELLA, new genus

WORKER.—Small, monomorphic, with hard integument. Head somewhat flattened, moderately large. Mandibles convex, subtriangular, with well-developed, dentate apical border. Clypeus with a convex and projecting, subrectangular, bicarinate, median lobe, the sides depressed and feebly emarginate; the median portion not extending far back between the frontal carinæ. Eyes rather small, well in front of the middle of the head; ocelli absent. Frontal area distinct; frontal groove absent; frontal carinæ short and lobular. Antennæ 11-jointed; the funiculi with a large basal joint and a large 3-jointed club, the terminal joint of which is very large; joints 2 to 5 very short and transverse. Thorax small, considerably narrower than the head; the pro- and mesonotum convex and rounded above and at the humeri, without promesonotal suture above; mesoëpinotal constriction deep and selliform; epinotum unarmed. Petiole very small, epedunculate, subeuboidal, without a node, unless a strong and prominent, anterior, transverse ridge, terminating in a tooth on each side be regarded as such. Postpetiole very small, rounded. Gaster elliptical, nearly as large as the head, the first segment forming about half its surface. Legs with incrassate femora and tibiæ, the middle and hind tibiæ without spurs; tarsal claws simple.

FEMALE AND MALE.—Unknown.

GENOTYPE.—*M. panamana*, new species.

Myrmecinella panamana, new species²

Figure 1

WORKER.—Length, 2 mm.

Head a little longer than broad, slightly narrower in front than behind, with rounded sides and posterior corners and feebly sinuate posterior border; the dorsal surface on each side and posteriorly slightly impressed for the accommodation of the antennæ but scarcely scrobe-like. Eyes flattened, near the anterior third of the head. Mandibles apparently 5-toothed, the two apical teeth large, the others small and rather indistinct. Clypeal lobe feebly notched in the middle, with marginate sides and rather sharp corners. The two clypeal carinæ are continued back a short distance onto the front between the frontal carinæ. Frontal area small, triangular, not impressed. Antennal scapes not reaching the posterior corners of the head; funicular joints 2-7 small, subequal, much broader than long; joint 8 larger and about as

¹Contributions from the Entomological Laboratory, Bussey Institution, Harvard University. No. 208.

²Types of new species described in this paper will be deposited in The American Museum of Natural History.

broad as long but much smaller than the second joint of the club, which is distinctly longer than broad; terminal joint nearly twice as long as the preceding joint. The whole club is slightly longer than the remainder of the funiculus. Promesonotum somewhat longer than broad, subhemispherical in profile; epinotum narrower than the promesonotum, longer than broad, its base in profile straight and horizontal, slightly lower than the promesonotum and as long as the rather abrupt declivity into which it passes through a distinct angle. Petiole from above nearly square, the

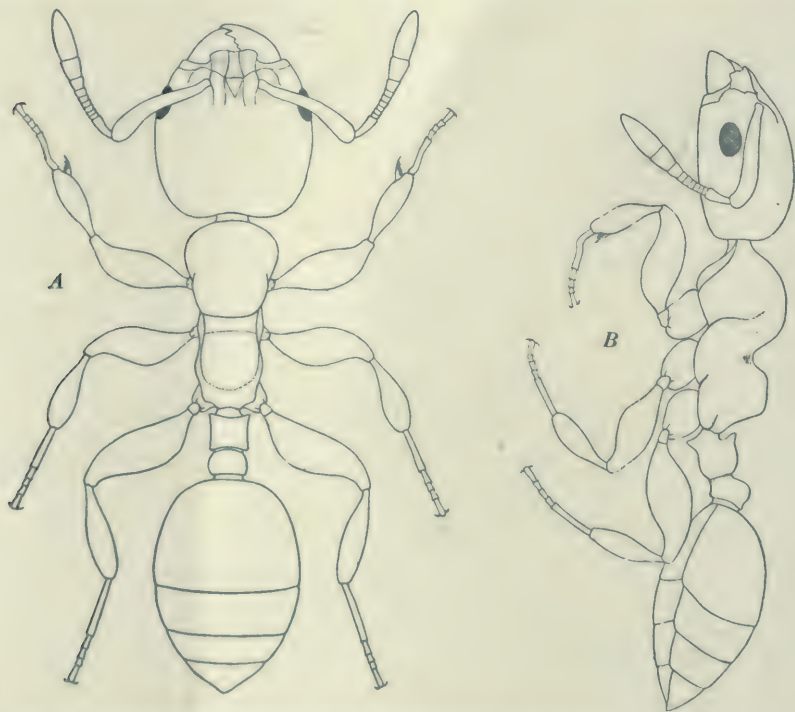


Fig. 1. *Myrmecinnella panamana*, new genus and new species. Worker. A, dorsal; B, lateral aspect.

sides feebly concave, the posterior corners nearly as sharp as the anterior corners which are formed by the ends of the peculiar, straight, transverse ridge; ventral surface with a large, triangular, downwardly directed tooth. Postpetiole as broad as the petiole but much shorter, nearly twice as broad as long, very convex and rounded above. Gaster rather flattened. Legs robust, with the femora, especially the fore and hind pairs, conspicuously thickened.

Mandibles shining, sparsely punctate; head, thorax, petiole and postpetiole subopaque. Clypeus with a few sharp longitudinal rugae. Front and sides of head punctate and finely, longitudinally rugulose; the longitudinal mid-dorsal third, from the front to the occiput very smooth and shining, with very minute, sparse, piliger-

ous punctures. Thorax, petiole and postpetiole very evenly and finely reticulate-rugose. Gaster, antennal scapes and legs smooth and shining.

Hairs white, very delicate, sparse, subappressed, short and inconspicuous on the head, thorax and appendages, longer on the gaster.

Castaneous brown; mandibles, antennæ, pedicel and legs slightly paler, more yellowish brown.

Described from two specimens which I found running on the bark of a living tree at Colon, Panama.

The genus *Myrmecinella* evidently belongs in Emery's tribe Myrmecini, the type genus of which is *Myrmecina*, represented by several species in the Palearctic, Oriental, Papuan, Australian and Nearctic Regions. To the same tribe Emery assigns nine other genera, namely, *Podomyrma*, *Lordomyrma*, *Atopomyrmex*, *Dilobocondyla*, *Tertaner*, *Atopula*, *Pristomyrmex*, *Acanthomyrmex* and *Dacryon*, all of which are confined to the Ethiopian, Oriental, Papuan and Australian Regions. *Myrmecinella* is therefore the only genus of the tribe that has come to light in tropical America. In its very small size and other characters it may be easily distinguished from any of the above-mentioned Old World genera.

PHEIDOLE subgenus **HENDECAPHEIDOLE**, new subgenus

While writing the description of *Pheidole tachigalia*, recently published in 'Zoologica' (Vol. 3, 1921, pp. 148-150), an ant which occurs in the leaf-petioles of *Tachigalia paniculata* Aublet and, as I have recently found, also in the stem-swellings of *Cordia nodosa* Lam. var. *hispidissima* Fres., I failed to count the antennal joints. I now find the number to be 11 in the soldier (Fig. 2A), worker, and female. The male is unknown, but Mr. Alfred Emerson has recently sent me another closely related undescribed species, represented by worker (Fig. 2B), female and male specimens. The male (Fig. 2C) also has 11-jointed antennæ, though the third funicular joint is long and shows a slight constriction in the middle on one side, indicating a fusion of two joints. It thus becomes necessary to place these two species in a new subgenus, which I will call *Hende apheidole*, intermediate between *Pheidole*, *sensu stricto*, with 12-jointed antennæ in the soldier, worker and female and 13-jointed antennæ in the male, and the subgenus *Decapheidole* Forel, which has 10-jointed antennæ in the soldier and worker. The male *Decapheidole* is unknown. The species of both of the subgenera are very small in all four phases compared with the species of *Pheidole*, *sensu stricto*. I regard *Pheidole tachigaliæ* as the type of the subgenus *Hendecapheidole*. A description of the undescribed species, taken by Mr. Emerson and dedicated to him, is appended.

***Pheidole* (*Hendecapheidole*) *emersoni*, new species**

WORKER.—Length, 1.3–1.6 mm.

Head subrectangular, as broad as long, scarcely narrower in front than behind, with nearly straight lateral and feebly emarginate posterior borders. Apical borders of mandibles with numerous minute, uneven teeth. Clypeus moderately convex, with entire, transverse anterior border. Frontal area distinct, elongate; frontal groove absent; frontal carinae very small and short. Eyes moderately convex, situated just in front of the middle of the head, their ommatidia large and rather few in number. Antennal scapes almost reaching the posterior corners of the head; first funicular joint fully twice as long as broad; second joint as long as broad, joints 3–7 shorter, club longer than the remainder of the funiculus, its two basal joints distinctly

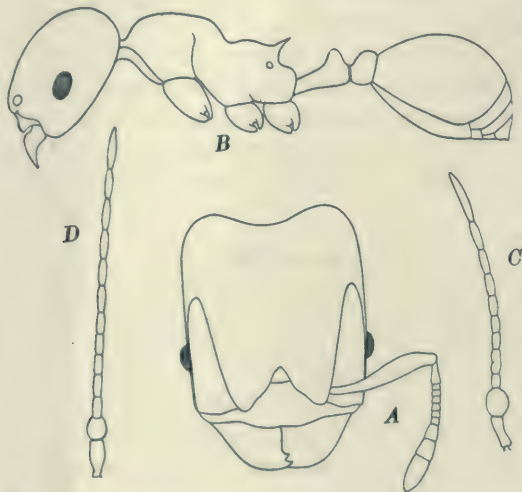


Fig. 2. A, *Pheidole* (*Hendecapheidole*) *tachigalae* Wheeler, head of soldier; B, *Pheidole* (*Hendecapheidole*) *emersoni*, new species; C, antenna of male of same species; D, antenna of male of *Pheidole pilifera* Roger.

longer than broad, together slightly shorter than the large terminal joint. Thorax similar to that of the *tachigalae* worker, the pro- and mesonotum forming a single convex mass, without suture or transverse welt, but the humeri are rounded and not prominent as in *tachigalae*. Mesoepinotal constriction short and deep; epinotum small, the base convex in profile, not longer than the declivity, the spines straight, acute, longer than broad at their bases but shorter than their distance apart, directed upward, outward and backward. Petiole small and slender, fully twice as long as broad and scarcely broader behind than in front, its sides straight and subparallel the node rather low but somewhat compressed anteroposteriorly, its border blunt and entire. Postpetiole small, only slightly broader than the petiole, broader than long, evenly rounded dorsally and laterally. Gaster oval, convex above, the anterior border of the first segment straight and transverse in the middle. Legs of the usual shape.

Mandibles smooth and shining; clypeus, head, thorax, petiole and ventral portion of postpetiole opaque, densely, finely and evenly punctate, or reticulate-rugulose; postpetiolar node, gaster, legs and antennal scapes smooth and shining.

Hairs whitish, long, erect and moderately abundant both on the body and appendages.

Brown; first gastric segment castaneous; head darker than the thorax and pedicel; mandibles, antennæ and legs brownish yellow.

FEMALE (deãlated).—Length, 2.3 mm.

Head shaped like that of the worker, but with more pronounced posterior corners and feeble scrobe-like impressions for the antennæ. Mandibles large and convex. Clypeus convex, with straight anterior border. Frontal area small, transverse, impressed. Eyes decidedly longer than their distance from the anterior margin of the head; gula with two acute teeth on its anterior border. Antennal scapes reaching only to about two-thirds the distance from the anterior to the posterior corners of the head. Thorax narrower than the head; broadly elliptical, the mesonotum and scutellum much flattened, the epinotal spines short, stout and acute. Petiole resembling that of the worker, but the anterior slope of the node is much less concave; postpetiole fully a third broader than the petiolar node, broader than long and broadest through the anterior corners, which are acute and projecting. Gaster elongate-elliptical, fully twice as long as broad; its anterior border concave.

Mandibles smooth and shining; clypeus, head, thorax, petiole and postpetiole opaque, finely and densely punctate, the scutellum and postpetiolar node smooth and shining. Clypeus indistinctly rugulose on the sides; head longitudinally rugulose, except on the scrobes, which are merely punctate. Gaster shining, with distinct, scattered, piligerous punctures. Similar punctures occur also on the scutellum and among the fine punctures of the mesonotum.

Hairs grayish and more abundant but in other respects much as in the worker.

Castaneous; mandibles and clypeus red; antennæ and legs brownish yellow.

MALE.—Length, 2.2–2.3 mm.

Head, excluding the eyes, longer than broad, broadly elliptical, not narrower in front than behind, flattened above. Eyes large, very close to the anterior border, less than half as long as the head. Mandibles small, spatulate, edentate. Clypeus feebly and evenly convex, with straight anterior border. Antennæ short, 11-jointed; scape very short, scarcely longer than the swollen, elliptical first funicular joint; third funicular joint twice as long as the second, with a transverse impression in the middle on one side; two succeeding joints each a little longer than the second funicular, the more apical joints longer, the last twice as long as the penultimate. Thorax long, broader than the head through the mesonotum which is convex anteriorly and flattened behind, without Mayrian furrows. Epinotum small, convex, its base and declivity scarcely distinct. Petiolar node very low, the postpetiole a little broader, as long as broad, not convex above and with rather straight sides. Gaster elongate-elliptical, with very distinct cerci. Legs slender. Wing venation as in typical *Pheidole*.

Opaque; very finely and densely punctate; gaster, mesopleuræ, mandibles, antennæ and legs smooth and shining; nodes of petiole and postpetiole also rather smooth.

Pilosity grayish and similar to that of the female but shorter. Wings also minutely hairy throughout, their posterior borders with long cilia.

Head and mesonotum black; remainder of body piceous, except the mandibles, antennæ, legs and genitalia, which are smoky yellowish. Mouth-parts whitish. Wings infuscated, with brown veins and pterostigma, the latter darker.

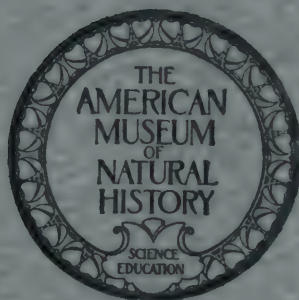
Described from numerous workers, a female and eight males taken by Mr. Alfred Emerson from a single colony nesting in a small cell within a termite nest at Kartabo, British Guiana. The species is close to *tachigaliæ*, but the females can be readily distinguished by striking differences in size, color, sculpture, and the development of the antennal scrobes. The worker *emersoni* is much darker than that of *tachigaliæ* and has the promesonotum more rounded above and with much less prominent humeri.

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No. 47

TWO NEW SUBGENERA OF NORTH AMERICAN BEES

By T. D. A. COCKERELL



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TWO NEW SUBGENERA OF NORTH AMERICAN BEES

By T. D. A. COCKERELL

PERDITA Smith

Although bees have been collected for many years in the vicinity of Boulder, Colorado, it has remained for Dr. Frank E. Lutz to discover one of the most interesting and peculiar forms which exists in this region. On June 5, 1922, in the immediate vicinity of White Rocks, not far from Boulder, Dr. Lutz observed that the flowers of *Opuntia greenei* evidently contained some insects, revealed by the movements of the stamens. Expecting to find beetles, he parted the masses of stamens, and extracted numbers of small bees. Others of the same species were caught flying around. On June 13, the spot was revisited, and Mrs. Cockerell, Dr. Lutz, and his son obtained an additional supply of these bees. Both sexes were represented in about equal numbers. On making microscopical mounts, cleared in caustic potash, it was found that both males and females had eaten large quantities of *Opuntia* pollen, which could be seen in the abdomen.

The bees belong to the genus *Perdita*, in the broad sense, but are so peculiar that they must be considered typical of a new subgenus which, according to the views of some authors should rather rank as a full genus. In dealing with the segregates from *Perdita*, one meets with very excellent characters which appear to be of generic value, but they are modified and combined in various ways, so that it becomes difficult to know how to define and limit the possible series of genera. Either we must recognize a number of small or monotypic genera for aberrant species, or we must apparently divide the group into somewhat arbitrarily defined units, into which certain forms will fit with difficulty. No doubt the tendency will be to recognize more genera at the expense of the old aggregate *Perdita* and, if the present insect is then considered to typify a distinct genus, no great harm will be done.

LUTZIELLA, new subgenus

Bees of the genus *Perdita*, peculiar in the following characters, or combination of characters. Mandibles simple in both sexes, but longer and more curved in the male. Labial palpi four-jointed, the first much longer than the other three combined. Maxillary palpi six-jointed, more than half the length of the blade; second joint longest.

Sigma narrow and lanceolate. Marginal cell long for *Perdita*, obliquely truncate. First recurrent nervure ending some distance BEFORE first intercubitus. Claws with an inner tooth in both sexes. Spurs on middle and hind legs pectinate, curved at end, in both sexes. Second ventral segment of male with a broad thickening on apical margin. Margin of fifth dorsal segment of male with a series of stout finely pubescent spine-like structures, actually modified bristles. Apex of male abdomen with a pair of widely separated elongate lobes, which are actually on the sixth segment. Sting palpi well developed, with long plumose hairs at end, but apparently the sting is not functional, as it is short and not very acute; the sheath is narrow and elongate, emarginate at apex.

Type.—*Perdita (Lutziella) opuntiae*, new species.

The details of the genitalia will be discussed at another time, in connection with a more general study of the Panurgidæ. The figures drawn by Miss Elizabeth McKay, from dissections made by her, bring out other interesting structural characters.

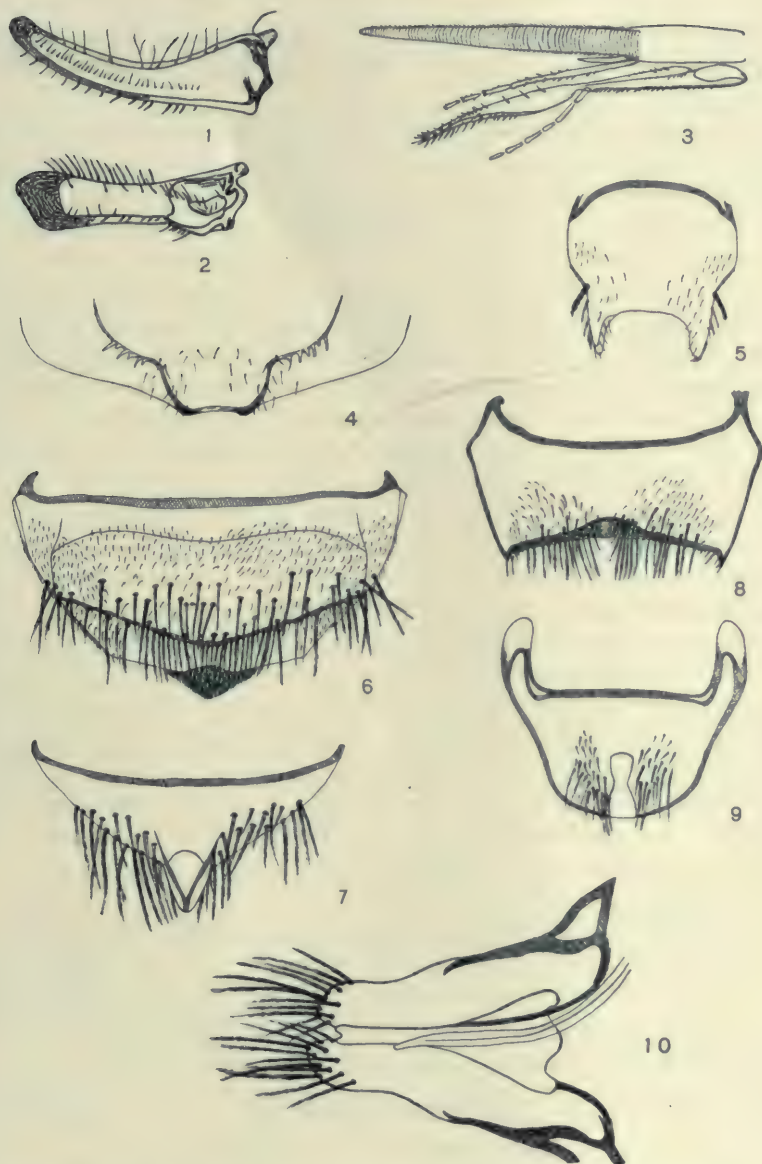
***Perdita (Lutziella) opuntiae*, new species**

Figures 1 to 10

♂. (Type).—Length 5.5 mm.; robust, with broad abdomen; head very large and broad, quadrate, the eyes diverging below; the broad and low clypeus (except minute dots and slightly reddish lower margin), lateral face-marks filling the broad space between clypeus and eye and sending a dentiform process a short distance up orbits, labrum, and mandibles except reddened apex, all cream-color; head otherwise black, the front and vertex dullish, the occiput and cheeks shining; antennæ rather short, pale reddish below, dark above; ocelli small; head and thorax with thin white hair; thorax black, the tubercles brownish; mesothorax polished, extremely finely punctured; mesopleura dullish; metathorax fringed on each side with white hair, its surface mainly dull, but the upper corners of the truncation swollen and shining; tegulæ reddish; wings hyaline, nervures and stigma pale brown; stigma narrow and lanceolate; marginal cell large, unusually long for a *Perdita*, broadly obliquely truncate; basal nervure falling very far short of nervulus; first recurrent nervure ending some distance before first intercubitus; femora dark, but coxæ and trochanters reddish; tibiæ dark, the anterior ones light reddish in front; tarsi pale reddish; abdomen entirely very bright ferruginous, a large dusky spot at each side of first segment sub-basally; surface of abdomen polished and shining; apex with a pair of widely separated long dentiform lobes; second ventral segment with the margin thickened and somewhat bilobed in middle.

♀.—Similar to the male, but with the abdomen duller, without the special structural features, the apex with a dark reddish sharply pointed pygidial plate; head ordinary, the face and labrum entirely black, but mandibles ferruginous, becoming whitish basally and darkened at apex; scape dark; legs black, the tarsi brownish; first abdominal segment with large black areas.

The mandibles are simple, and the claws dentate in both sexes. The maxillary palpi are six-jointed, the second joint longest; the palpi much more than half the length of the maxillary blade, whereas they are much less than half the length in *P. halictoides* Smith, the type of the genus.



Figures 1 to 10.—Structures of *Perdita (Lutziella) opuntia*, new species.

1, Mandible of Male. 2, Mandible of Female. 3, Mouth-parts of Male. 4, Second Ventral Abdominal Segment of Male. 5, Sixth Dorsal Abdominal Segment of Male, showing the Spine-like Structures at the end of the Abdomen. 6, Fifth Dorsal Abdominal Segment of Female. 7, Sixth Dorsal Abdominal Segment of Female. 8, Fifth Ventral Abdominal Segment of Female. 9, Sixth Ventral Abdominal Segment of Female. 10, Sting, with Sheath and Sting-palpi.

The labial palpi are four-jointed, the first joint much longer than the other three combined; the third longer than the fourth, and the second than the third.

The male of the Californian *P. macrostoma* Cockerell, by the red abdomen bilobed at apex, resembles *P. opuntiae*, but it has the second ventral segment unmodified, the head and thorax green, and the first recurrent passing beyond the first intercubitus. It also has a supra-clypeal band, lacking in *P. opuntiae*, and distinct dog-ear marks, represented by very small spots in *P. opuntiae*. The stigma of *P. macrostoma* is much larger. The stigma of *P. opuntiae* resembles that of *Macroteropsis latior* (Cockerell), but the marginal cell is not so obliquely truncate, and the maxillary palpi are quite different. The mandibles also are quite different in *Macroteropsis*, being bifid apically. The mandibles and face-markings of male *P. opuntiae* closely resemble those of *P. crassiceps* Cockerell, but that has the abdomen dark brown.

In *Annals and Magazine of Natural History*, December 1899, p. 414, there is given a table showing the relation between the lengths of the first and remaining joints of the labial palpi in species of *Perdita*. At that time the measurements of *P. halictoides*, the type of *Perdita*, could not be given, but we now know that the first joint is about 544μ , and the other three combined about 224μ , the latter about 41% of the former. In *P. opuntiae* the first joint is about 832μ , the last three together 480μ , the latter about 58% of the former. Thus, in respect to the labial palpi, *P. opuntiae* resembles the species of the subgenus *Perditella*, though it differs in most other respects, the venation, for example, being extremely different. In the Argentine there is a Panurgid, *Camptopoeum opuntiarum* Joergensen, which appears to be oligotropic upon *Opuntia*. It has no resemblance to the Colorado bee.

From the *Opuntia* flowers at White Rocks, June 13, Mrs. Cockerell also took a male *Lithurgus apicalis* Cresson, a female *Agapostemon texanus* Cresson, and a female *Colletes*. There were also specimens of *Epicaula* on the cacti, and a single specimen of *Moneilema*, which I am unable to identify with any of the species indicated by Casey.

EXOMALOPSIS Spinola

PACHY CERAPIS, new subgenus

Male antennae with the flagellum greatly thickened, the middle portion dentate or serrate beneath; clypeus and labrum of male yellow; three submarginal cells; hind tibiae of male greatly swollen, their tarsi with very long white hair; hind margins of abdominal segments with broad bands of tomentum. The hind femora are quite ordinary, and the hind tarsi are not dentate. The stigma is small and short, and the

marginal cell is not sharply pointed.

Type.—*Exomalopsis* (*Pachycerapis*) *cornigera*, new species.

Related to the genus or subgenus *Anthophorula* Cockerell, but easily known by the peculiar antennæ. The swollen tibæ and some other characters remind one of *Ancylosceles*, but there is no close affinity. So far as I can determine from the description, *E. serrata* Friese, from Orizaba, Mexico, is also a species of *Pachycerapis*.

***Exomalopsis* (*Pachycerapis*) *cornigera*, new species**

♂.—Length about 5 mm.; black, with the clypeus and labrum yellow (redened by cyanide in type); mandibles ferruginous; face (especially sides), lower part of cheeks, and pleura with white hair; occiput and thoracic dorsum with very pale yellowish-tinted hair; front polished and shining, with a deep median groove; ocelli in a line; scape yellow, long and rather thick; flagellum strongly incrassate, pale orange-yellow, joints 10 to 12 more or less dusky above, middle joints dentiform beneath, apical joint flattened and curved; mesothorax and scutellum shining, with fine punctures; tegulæ dark rufous; wings pale brownish, stigma and nervures dusky reddish; extreme base of wings clear ferruginous; legs black, small joints of tarsi rufescent; all the tibæ swollen, but the hind ones greatly so; abdomen closely and quite strongly punctured, first segment hairy all over, segments 2 to 5 with broad bands of grayish tomentum; apex with no special armature.

Sabino Basin, Sta. Catalina Mts. Arizona, 32° 22' N., 110° 46.5' W.; about 3800 feet above sea-level; July 8–20, 1916; (Lutz).

Easily known from *E. serrata* Friese, the latter being densely fulvous-haired, with yellowish-white mandibles. There can be little doubt, however, that the two are closely allied. *E. serrata* is larger than *E. cornigera*, being 7 to 8 mm. long.

***Exomalopsis solani* Cockerell**

This is a typical *Exomalopsis*, but its known distribution is greatly extended by the American Museum materials, collected by Dr. Lutz.

Colorado.—1 ♀; Pueblo; August 9, 1920; on a vacant lot in town. This is the first *Exomalopsis*, *sensu stricto*, from Colorado.

Texas.—5 ♀; Marathon, Brewster County; July 1–2, 1916; at *Cassia*.

Arizona.—1 ♀; north side of Kits Peak, Baboquivari Mts., Pima County, 32° N., 111° 36' W.; about 3650 ft. alt.; August 7–9, 1916. 1 unusually small ♀; west side of Santa Rosa Valley, near the Comobabi Mts.; about 3425 ft. alt.; August 9–10, 1916.

In New Mexico, it is known to occur in the Middle Sonoran zone, from Mesilla to Albuquerque.

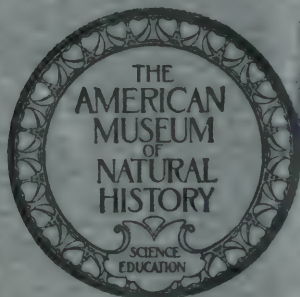
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AMERICAN MUSEUM NOVITATES

No. 48

NEOTROPICAL ANTS OF THE GENERA *CAREBARA*, *TRANOPELTA* AND *TRANOPELTOIDES*, NEW GENUS

BY WILLIAM MORTON WHEELER



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NEOTROPICAL ANTS OF THE GENERA *CAREBARA*, *TRANOPELTA* AND *TRANOPELTOIDES*, NEW GENUS¹

BY WILLIAM MORTON WHEELER

Our knowledge of most of the subterranean, or hypogæic myrmicine ants of the American tropics is still very meager. Of the seven genera of the Ethiopian and Indomalayan Regions (*Solenopsis*, *Carebara*, *Pheidologeton*, *Aneleus*, *Oligomyrmex*, *Aëromyrma* and *Liomyrmex*) and the same number of neotropical genera (*Solenopsis*, *Carebara*, *Carebarella*, *Erebomyrma*, *Spelæomyrmex*, *Tranopelta* and *Tranopeltoides*) only two, *Solenopsis* and *Carebara*, are represented in both hemispheres. The South American species of *Allomerus*, which have minute yellow workers and large, dark-colored males and females, and would therefore seem to belong among the genera just mentioned, inhabit the cavities of living plants, as I shall show in another publication, and cannot be regarded as hypogæic. While the genus *Solenopsis* is represented by the greatest number of species in South America, *Carebara* was not known to occur beyond the confines of the Ethiopian and Indomalayan regions till ten years ago, when Santschi described the female and male of a species from French Guiana. The discovery, on my recent trip to British Guiana, of all three phases of a closely allied species and of the workers of the true *Tranopelta gilva* Mayr, together with a study of certain forms which must be referred to a new but closely allied genus, has led me to undertake the following brief revision of the South American species of *Carebara*, *Tranopelta* and *Tranopeltoides*.

CAREBARA Westwood

Carebara bicarinata Santschi

Carebara bicarinata, SANTSCHI, 1912, Bull. Soc. Ent. France, p. 139, 2 figs., ♂ ♀;
WHEELER, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 170.

According to Santschi, the female of this species, taken by Le Moult in French Guiana, measures 12–12.8 mm. and is pale brownish yellow, with slightly infuscated wings. The male measures 9.3 mm. and is described as testaceous yellow, with the sides of the mesonotum, and in some cases the terminal gastric segments, more or less reddish

¹Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 210.

brown. The males were found to be variable and Santschi was not sure that they belonged to the same species as the female. He also mentions one male from Goya, Brazil (J. de Gaulle) as measuring 10.5 mm. The uncertainty of the specific identity of his males and females is increased by the occurrence of more than one species of *Carebara* in the Guianas and the Amazon valley.

***Carebara winifredæ*, new species**

WORKER (Fig. 1).—Length, 2.3–2.5 mm.

Head subrectangular, slightly longer than broad, as broad in front as behind, with nearly straight, subparallel sides and slightly concave posterior border. Mandibles rather convex, with somewhat oblique, 4-toothed apical borders. Clypeus longitudinally concave in the middle, bluntly bicarinate, each carina terminating in a blunt tooth on the anterior border; the sides narrow and depressed. Frontal area obsolete; frontal groove short and rather deep; frontal carinæ small. Eyes absent. Antennæ 9-jointed; scapes two-thirds as long as the head; first funicular joint twice as long as broad; joints 2–4 nearly twice as broad as long; joints 5 and 6 longer but distinctly transverse; the large two-jointed club much longer than the remainder of the funiculus, the basal joint longer than broad, half as long as the terminal joint. Thorax rather small, the pro- and mesonotum somewhat flattened above, the humeri and sides rounded; the promesonotal suture obsolescent. Mesoepinotal constriction short and acute; epinotum as long as broad, narrowed behind, in profile rounded and sloping, the declivity abrupt, longitudinally concave in the middle, delicately marginate on each side. Petiole with a short, slender peduncle, the node abrupt, rounded, from above transversely elliptical, fully twice as broad as long. Postpetiole very similar and scarcely broader, but in profile distinctly lower than the petiolar node. Gaster somewhat larger than the head, broadly elliptical, the anterior border concave; first segment forming about two-thirds of its surface. Legs rather short; joints 2–4 of fore and middle tarsi not shorter than long.

Mandibles shining; the remainder of the body only moderately so, the inner borders of the mandibles with several small, sharp punctures. Head, thorax, pedicel and gaster evenly and finely punctate, the punctures on the head more distinct, on the appendages much finer and more superficial.

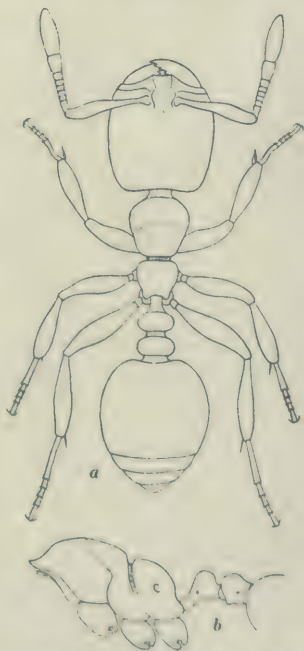


Fig. 1. *Carebara winifredæ*, new species. a, Worker, dorsal view; b, thorax and pedicel of same in profile.

Hairs and pubescence pale yellow, the former short and confined to the clypeus and tip of gaster, the pubescence very short, fine and appressed, arising from the punctures and scarcely more distinct on the body than on the appendages.

Pale yellow; the legs, pedicel and gaster paler and more whitish; mandibles reddish with black teeth. Sides of clypeus and mesoëpinotal constriction brownish.

FEMALE.—Length, 10–10.5 mm.; wings, 13.5 mm.

Head, including the eyes, distinctly broader than long, broader behind than in front, with nearly straight posterior border and slightly concave, subparallel cheeks. Eyes moderately convex, half as long as the sides of the head; ocelli large, close together, in subconfluent depressions. Mandibles large, their apical borders broad, 8-toothed, the four basal teeth small and rather indistinct. Clypeus bluntly bicarinate, concave in the middle, the anterior border rounded, somewhat projecting, slightly sinuate in the middle. Frontal groove deep, extending from the pointed, backwardly projecting median portion of the clypeus to the anterior ocellus. Antennæ slender, 10-jointed, the scapes reaching to the posterior orbits; second and third funicular joints a little broader than long, the fourth and fifth as long as broad; the remaining joints longer than broad, the terminal being as long as the two preceding subequal joints together. Thorax rather long and narrow, scarcely as broad as the head through the eyes, the mesonotum one and one-half times as long as broad, convex above, as is also the scutellum, the epinotum short, its base sloping, much shorter than the abrupt declivity which is very feebly concave in the middle and indistinctly marginate on the sides. Petiole similar to that of the worker but with broad, stout peduncle and less convex node; the postpetiole from above more depressed, subrescentic, with rather strong posterior border. Gaster large, suboblong, somewhat shorter than the remainder of the body; the first segment forming less than half of its surface, the fourth segment large, blunt and rounded. Legs rather slender. Wings long; radial cell closed.

Smooth and shining; mandibles striate at the base, towards the tips coarsely striatopunctate, the two areas separated by a small, smooth space. Clypeus smooth in the middle, coarsely punctate on the sides. Remainder of body evenly punctate, the punctures sharper on the head, much sparser on the pro- and mesonotum, which are more shining; cheeks, gula, mesopleuræ and epinotum very finely longitudinally striate.

Hairs yellow, very short, present only on the clypeus, gula and tip of gaster; pubescence also very short, appressed and dilute, arising from the punctures.

Pale castaneous; clypeus, mandibles and posterior portion of gaster darker; legs paler, yellowish brown; wing-membranes opaque, fuliginous; veins and pterostigma yellow, with strong black borders.

MALE.—Length, 7–7.5 mm.; wings, 7.5–8 mm.

Head, including the eyes, nearly twice as broad as long, convex behind in the ocellar region. Eyes very large and convex, taking up the whole of the sides of the head; ocelli large and prominent. Mandibles with a large apical tooth and three or four minute basal teeth. Clypeus concave behind and laterally, with a large convex tubercle in the middle, the anterior border rounded and entire. Antennæ 13-jointed; long and filiform; scapes somewhat compressed, shorter but stouter than the second funicular joint; first funicular joint a little longer than broad; remaining joints cylindrical, subequal, except the second and last, which are longer than the others. Thorax similar to that of the female, but shorter; petiole also similar, but the node less elevated and concave in the middle; postpetiole campanulate, broader than the petiole. Gaster elongate elliptical. Legs slender.

Subopaque; gaster and mesonotum more shining; head more opaque, especially behind, where it is sharply reticulate-rugulose. Mandibles opaque, punctate. Mesonotum and scutellum distinctly, pleuræ very indistinctly, gaster finely and superficially punctate.

Pilosity and pubescence much as in the female, but the pubescence longer on the upper surface of the gaster.

Pale brownish yellow; legs clearer yellow; posterior half of head black; mesonotum with a long anteromedian and two long lateral, dark brown stripes; anterior half of head, wing-insertions and metanotum brown; wings colored as in the female; but the dark borders of the veins narrower.

Described from numerous workers, four females and six males, which were brought to me in a living condition August 5, 1920, by Mr. Alfred Emerson, who took them from the depths of a large termitarium of *Syntermes dirus* Klug, under the roots of a huge moro tree on the left bank of the Cuyuni River, near Kartabo, British Guiana. The species is dedicated to Mrs. Winifred J. Emerson. It is evidently very close to *bicarinata*, but both the male and female are smaller and the coloration of the body and wings of the female is much darker. Perhaps *winifredæ* is merely a subspecies of Santschi's species, but the latter may prove to be based on the sexual phases of *C. anophthalma* (*vide infra*).

The finding of *C. winifredæ* in the nest of *Syntermes dirus*, which Mr. Emerson informs me is, of all South American termites, the most like the African species now referred to the genus *Termes* (*sensu stricto*) and hence like the species with which the African carebaras live, is of unusual interest in connection with the zoögeographical hypothesis of a former land-connection between Africa and South America. It is certain, however, that the termites once had a much wider range than at present, since we find them in the Miocene of Florissant, Colorado, and in the Baltic amber of Lower Oligocene age. It is not improbable, therefore, that the genus *Carebara* may also have had a circumpolar distribution in the northern hemisphere during the early and middle Tertiary. Hence we are not compelled to regard the occurrence of *C. winifredæ* with *Syntermes dirus* as proof positive of the former existence of von Ihering's "Archihelenis" or of similar constructions.

Carebara anophthalma (Emery)

Oligomyrmex anophthalmus EMERY, 1905, Bull. Soc. Ent. Ital., XXXVII, p. 138, note, ♀.

Carebara anophthalma WHEELER, 1922, Bull. Amer. Mus. Nat. Hist., XLV, p. 170, ♀.

WORKER.—Uniformly pale yellow, shining, with moderately dense, pubigerous punctuation; the short pubescence apparently adherent, and there are no erect hairs, probably owing to the defective preservation of the specimen (for I feel cer-

tain that there should be a few small hairs, at least on the clypeus). Head a little longer than broad, broader behind, feebly concave at the posterior border. Mandibles with 4 teeth. Clypeus strongly elevated in the middle, but edentate. Frontal carinae very short. No traces of eyes. Antennae short and thick; 9-jointed; the scape only slightly surpassing the middle of the length of the head; second joint as long as the three following; joints 3-7 transverse; the two last forming a club, the last joint as long as the whole remainder of the funiculus, less its basal joint. Thorax feebly impressed between the mesonotum and epinotum; the latter curvilinear in profile. Nodes of petiole and postpetiole transversely oval, as broad as the epinotum. Legs short and robust; joints 2-5 of the fore and middle tarsi broader than long. Length, 1.6 mm.

Ega, on the Amazon; a single specimen from the collection of F. Smith, with the label "new genus, 9 joints in antenna." (Emery)

In all probability the specimen was taken by H. W. Bates.

As this description applies rather closely to the worker of *C. winifredæ*, described above, I sent Professor Emery specimens of the latter to compare with the type of *anophthalma*. He wrote me that they are specifically distinct and kindly sent camera lucida sketches of the head, thorax and pedicel of the Brazilian species. The head of this species is somewhat longer, more narrowed anteriorly; the epinotum is decidedly smaller and proportionally much shorter, and the postpetiolar node is broader in comparison with the petiolar node. As already suggested, this species may be the worker of the form described by Santschi as *C. bicarinata*.

Carebara mayri (Forel)

Tranopelta mayri FOREL, 1901, Mitth. Naturhist. Mus. Hamburg, XVIII, p. 61, ♂.
Carebara mayri SANTSCHI, 1912, Bull. Soc. Ent. France, p. 140, ♂.

According to Santschi, this species, described by Forel as a *Tranopelta*, from a specimen taken by Captain Jerdmann in Paraguay, is a *Carebara*. Forel's description is very brief, but von Brunn, who compared the venation of the type in the Hamburg Museum with that of the male *C. bicarinata* sent him by Santschi, found it to be the same in both species. Forel gives the length of *mayri* as 9 mm. I refer to this species a single male measuring 8.5 mm. and taken by Dr. Roman at Apipica on the Rio Autaz, Brazil (Royal Museum of Stockholm). It differs from the male of *winifredæ* in its larger size and in the following characters: the body is more brownish yellow; the median dark brown stripe on the mesonotum is lacking; the wings are much paler; the scapes of the antennae are more swollen and more convex anteriorly; the node of the petiole is not impressed in the middle and the pubescence on the thorax and antennae is longer, denser and more conspicuous.

TRANOPELTA Mayr***Tranopelta gilva* Mayr**

Tranopelta gilva MAYR, 1866, Sitzb. Akad. Wiss. Wien, LIII, p. 514, ♀ ♂; EMERY, 1890, Bull. Soc. Ent. Ital., XXII, p. 53, ♂; DALLA TORRE, 1893 'Cat. Hymen.,' VII, p. 74, ♀ ♂; FOREL, 1899-1900, 'Biol. Centr. Amer.,' 'Hymen.,' p. 79, ♀ ♂; FOREL, 1912, Mém. Soc. Ent. Belg., XX, p. 3, ♀ ♂; EMERY, 1919, Bull. Soc. Ent. France, p. 61, ♀ ♂; WHEELER, 1922, Amer. Mus. Novitates, No. 45, p. 8, ♀ ♂.

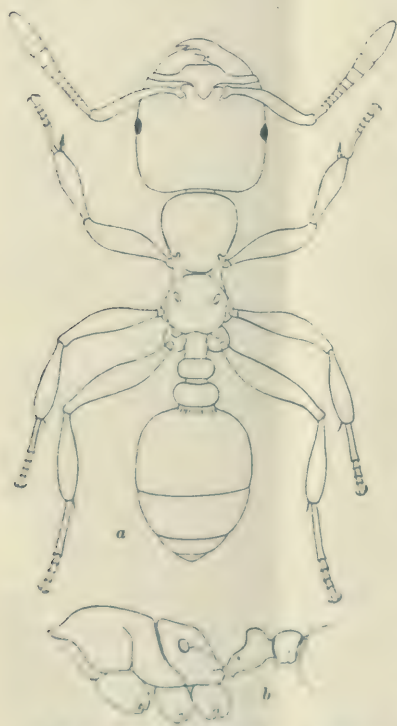


Fig. 2. *Tranopelta gilva* Mayr. a, Worker of the typical form of the species, dorsal view; b, thorax and petiole of same in profile.

WORKER (undescribed, Fig. 2).—Length, 2.3-3.2 mm.

Very feebly polymorphic. Head subrectangular, as broad as long, very slightly narrower in front than behind, with straight sides and concave posterior border. Eyes minute, reduced to about 8-12 facets, situated at the middle of the sides of the head. Mandibles moderately large and convex, their apical borders oblique, with four subequal teeth, or sometimes five in small individuals. Clypeus rather convex in the middle, without carinae, its anterior border rounded and entire. Frontal carinae small; frontal area and frontal groove absent. Antennae 11-jointed, rather slender, the scapes extending a little beyond the middle of the head in large, proportionally longer in smaller individuals; first funicular joint fully as long as the three succeeding joints together, second joint nearly as long as broad; joints 3-7 distinctly broader than long; the last three joints forming a club, which is longer than the remainder of the funiculus; the two basal joints longer than broad and together a little shorter than the enlarged terminal joint. Thorax rather small, much broader through the pronotum than through the epinotum; promesonotal suture extremely faint or obsolete, the dorsal surface of the pro- and mesonotum,

flattened, nearly straight in profile; the mesonotum narrowed behind to the short, acute and not very deep mesoepinotal constriction. Epinotum from above a little longer than broad, slightly concave in the middle; in profile with the base and declivity subequal and meeting at a very obtuse angle; the former continuing the dorsal outline of the pro- and mesonotum. Epinotal stigmata large and circular. Petiole with a very distinct peduncle, which is swollen at the stigmata; the node abrupt, somewhat scale-like, with rather sharp anterior border above, its anterior surface

flattened, its posterior surface more convex, from above transversely elliptical, about twice as broad as long; the ventral surface convex in the middle, anteriorly with a small, acute, downwardly directed tooth. Postpetiole rounded, lower than the petiolar node and slightly broader, about one and one-half times as broad as long, its anteroventral border in profile acute and tooth-like. Gaster broadly elliptical, somewhat flattened dorsoventrally, the first segment forming about half its surface. Legs slender and moderately long; joints 2-4 of the fore tarsi broader than long.

Smooth and shining; mandibles striatopunctate; body sparsely punctate, the punctures on the head sharper and more conspicuous; neck, mesopleuræ and sides of epinotum subopaque and very finely striate; peduncle of petiole finely reticulate-rugulose.

Hairs pale yellow, rather abundant, erect, coarse and uneven on the body; shorter, denser and more reclinate on the appendages. The hairs on the vertex, thorax and pedicel longer than elsewhere. Pubescence undeveloped, except on the gula and sides of the head, where it is long and subappressed.

Yellow; legs and gaster paler, more whitish; mandibles reddish, their teeth, the anterior border of the clypeus and the articulations of the funicular joints dark brown.

The gynetypes and androtypes of this species were from Venezuela (C. A. Dohrn), and males and females have been recorded also from Colombia; Pará, Brazil (Goeldi); Alajuela and Juan Viñas, Costa Rica (A. Alfaro); and the Volcan de Chiriqui, Panama (Champion). I have seen specimens from Port of Spain, Trinidad (Aug. Busck), Belem, near Pará, Brazil (W. A. Schulz), Lassance, Minas Geraes, Brazil (J. C. Bradley), Bartica, British Guiana (Wm. Beebe), Barakara and Kartabo, British Guiana (Wheeler). The males and females are common at lights and the foregoing records are undoubtedly from such specimens. The description of the worker is drawn from specimens from two colonies containing also many females and males. One colony was taken at Kartabo, August 3, 1920, while Mr. Alfred Emerson and I were excavating a large colony comprising more than 500 workers of the formidable stinging ponerine, *Paraponera clavata* Fabr. The *Tranopelta* were occupying small chambers one to one and one-half feet below the surface of the soil and communicating with the galleries of the *Paraponera*. In this case the smaller species was evidently behaving as a thief-ant. On August 1 I found the stomach of a four-toed ant-eater (*Tamandua tetradactyla*) to contain no less than 14 species of ants, a large proportion of which consisted of hundreds of workers and dozens of males and winged females of *Tranopelta gilva*. The ant-eater must have unearthed and devoured a very flourishing colony of this ant. July 15 I found at Barakara, on the right bank of the Mazaruni River, a large colony of *gilva*, comprising hundreds of workers but no sexual forms, under the bark of a living tree. On the surface of the wood the

ants were attending numerous snow-white coccids which have been recently described by Mr. Harold Morrison as *Ripersia subcorticis*. There is nothing to indicate that *T. gilva* occurs with termites. Mr. Alfred Emerson, who has carefully studied the termites of British Guiana and has conscientiously preserved all the ants and other organisms which he has found with them, has never taken *T. gilva* in or near the nests. It would seem, therefore, that this ant sometimes leads an independent life and that when it behaves as a thief-ant prefers to associate with other Formicidæ.

***Tranopelta gilva* variety *amblyops* (Emery)**

Monomorium amblyops EMERY, 1894, Bull. Soc. Ent. Ital., XXVI, p. 148, ♀; FOREL, 1911, Deutsch. Ent. Zeitschr., p. 299, ♀.

Tranopelta gilva var. *brunnea* FOREL, 1909, Deutsch. Ent. Zeitschr., p. 259, ♀ ♂ ♀.

Tranopelta gilva var. *brunnea* FOREL, 1909, Deutsch. Ent. Zeitschr., p. 259, ♀ ♀ ♂.

Tranopelta amblyops EMERY, 1919, Bull. Soc. Ent. France, p. 61, ♀ ♀ ♂.

According to Emery, Forel's *T. gilva* var. *brunnea*, originally described from San Bernardino, Paraguay (K. Fiebrig), is a synonym of his *Monomorium amblyops*, described from Matto Grosso, Brazil. An examination of male, female and worker cotypes of Forel's form, and a female and several males recently taken by Dr. J. C. Bradley at Lassance, Minas Geraes, Brazil, shows that they represent merely a variety of *gilva*. The worker and male are very close to the corresponding phases of the typical form. In the worker *amblyops* the eyes are perhaps a trifle smaller, the antennæ somewhat shorter, the median funicular joints slightly more transverse. In the male the body, and especially the head and thorax, are of a more brownish-yellow color. In the female the surface of the body is decidedly more shining and much less densely pubescent, the mandibles, head, thorax and pedicel are of a castaneous-brown color, much darker than in the typical *gilva*; the wings are also darker, and the ventral surface of the petiole is not provided with an acute, downwardly directed spine. This spine is apt to be absent also in the male.

***Tranopelta gilva* variety *albida* (Mann)**

Tranopelta gilva var. *albida* MANN, 1916, Bull. Mus. Comp. Zool., LX, p. 446, ♀.

?*Tranopelta gilva* EMERY, 1919, Bull. Soc. Ent. France, p. 61, ♀.

My cotypes of this form, taken by Dr. Mann on the Madeira-Mamoré R. R., in Matto Grosso, Brazil, show that it is a distinct variety, as he maintained, and not the worker of the typical *gilva*. The specimens are smaller (1.5-2 mm.) and decidedly paler, being whitish; the antennal scapes are a little longer, the anterior border of the petiolar node is a little more acute, and the eyes are even smaller than in the var. *amblyops*.

Tranopelta heyeri, (Forel)

Monomorium heyeri FOREL, 1901, Ann. Soc. Ent. Belg., XLV, p. 389, ♀.

Tranopelta heyeri FOREL, 1913, Bull. Soc. Vaud. Sc. Nat., (5) XLIX, p. 17, ♀;

EMERY, 1919, Bull. Soc. Ent. France, p. 61, ♀.

A dimorphic species, the major worker resembling a *Pheidole*, but grading into the minor forms.

WORKER MAJOR.—Length, 4–4.2 mm. Mandibles thick, smooth, shining, with scattered punctures, a few striæ towards the tips and about four teeth. Clypeus slightly convex, without teeth or carinæ, but feebly notched in the middle of its anterior border, slightly impressed behind the notch and slightly or scarcely convex in the middle portion, which presents a suggestion of the two carinæ seen in the other species. Head large, square, as broad as long, slightly narrowed anteriorly, feebly concave behind, resembling that of a soldier *Pheidole*, with a feeble but rather distinct occipital furrow, disappearing on the vertex. Frontal area triangular. A median pit on the front of the vertex in place of the anterior ocellus. The eyes, situated a little in front of the middle of the sides of the head, are very small and flat, composed of about a dozen partly atrophied facets. Antennæ short; 11-jointed; club of three joints, about as long as the rest of the funiculus, thick, with the last joint at least as long as the two preceding united; the other joints, except the first, broader than long. Frontal carinæ short; frontal groove short and indistinct. Promesonotal suture almost obsolete; pronotum large, robust, almost shouldered. Mesoëpinotal suture deeply impressed, but without a constriction properly so-called, forming only a short interruption in the thoracic dorsum, which is feebly convex and scarcely higher in front than at the basal face of the epinotum. The latter is slightly longer than the declivity into which it passes insensibly, with two feeble longitudinal swellings, separated by a concavity or shallow longitudinal groove. Petiolar node pedunculate anteriorly and abruptly surmounted behind by a large, scale-shaped node with straight superior border, lower and broader than in (*Monomorium*) *latastei*, less thickened and broader than in *amblyops*. Postpetiolar node transverse, more or less rectangular but rounded and narrower at the anterior corners, much broader than long. Legs rather short.

Smooth and very shining, with scattered, fine, often brownish, piligerous punctures. Antennal fossæ, frontal carinæ and sides of clypeus longitudinally and somewhat obliquely striated. Sides of mesonotum reticulate-punctate and more or less opaque.

An erect, yellowish, rather fine pilosity is everywhere rather uniformly distributed, somewhat oblique on the tibiæ and antennæ, where it is shorter and a little more abundant. Pubescence almost absent.

Entirely pale yellow; even the abdomen very pale. Mandibles and sides of clypeus reddish. Articulations of appendages slightly infuscated.

WORKER MINOR.—Length, 2.7–2.9 mm. Like the major, but the head, though large, square and at least as broad as long, is much smaller, without occipital furrow and scarcely concave behind. The clypeus, though not bicarinate, has nevertheless indications of the two carinæ of the genus (*Monomorium*). Eyes with only 4 to 6 facets. Petiolar node slightly thicker and narrower. In other respects like the worker major, but the sides of the mesonotum are subopaque, more feebly reticulate and the color is even paler.

A single worker media is intermediate (3.3 mm.).

St. Leopoldo, Rio Grande do Sul, Brazil, living only with termites, where it was discovered by Mr. Heyer. Received from Mr. Wasmann. (Forel)

The species is also recorded by Forel from São Paulo, Brazil, where it was taken by von Ihering.

***Tranopelta heyeri* variety *columbica* (Forel)**

Tranopelta heyeri var. *columbica* FOREL, 1912, Mém. Soc. Ent. Belg., XX, p. 3, ♀.
? *Tranopelta gilva* EMERY, 1919, Bull. Soc. Ent. France, p. 61, ♀.

This form is doubtful. It may be the same as the one later described by Mann as *T. gilva* var. *albida* or it may be, as Emery suggests, the minor worker of the typical *gilva*. The following is Forel's description.

WORKER.—Length, 1.6–2.6 mm. Even paler than the type of the species and much smaller; white, scarcely yellowish. In other respects very similar, but the posterior portion of the clypeus between the frontal carinae is narrower, very much as in *gilva* var. *brunnea* Forel. The largest worker has a proportionally much smaller head than in the type of *heyeri*, but perhaps I failed to find the worker maxima. In other respects like the type of the species; eyes with 4 to 6 facets.

Dibulla, in the ground, at the bottom of the nest of *Mycocephurus smithii* Forel, and San Antonio, in a subterranean nest, beneath dried cow-dung, Sierra Nevada de Santa Marta, Colombia.

***Tranopelta subterranea* (Mann)**

Monomorium (*Mitara*) *subterraneum* MANN, 1916, Bull. Mus. Comp. Zoöl., LX, p. 444, Pl. iv, figs. 29, 30, ♀.

Tranopelta subterranea EMERY, 1919, Bull. Soc. Ent. France, p. 61, ♀.

I agree with Emery, that this species, taken by Dr. Mann on the Madeira-Mamoré R. R. in Matto Grosso, Brazil, is a *Tranopelta*, but it certainly differs from the other species in several important particulars. The clypeal margin is sinuate in the middle, the mandibles are 6-toothed, the legs and antennae are long, the mesoëpinotal constriction is very pronounced, the first segment of the gaster forms nearly its whole surface and the color is reddish testaceous instead of pale yellow. There is considerable difference in the size of the body (3.5–5 mm.) and especially of the head. Dr. Mann found the specimens about three feet below the surface of the soil.

TRANOPELTOIDES, new genus

The female ant described by Forel as *Tranopelta huberi* seems to me to belong to an undescribed genus for which I would suggest the name *Tranopeltoides*. It differs from the female *Tranopelta* in possessing spines on the epinotum, thus indicating an even higher development of these structures in the worker. Moreover, I have found two males that

appear to belong to the same genus. They have very short, 11-jointed antennæ, with very short scape and globular first funicular joint. Very probably, therefore, all three phases of the species which I refer to this genus have 11-jointed antennæ, instead of the antennæ being 11-jointed only in the worker and female and 13-jointed in the male as in *Tranopelta*. The veins in the hind wing of the female, and especially of the male, are few and feebly developed as compared with *Carebara*, *Tranopelta*, etc. The following species is to be regarded as the type of the genus.

***Tranopeltoides huberi* (Forel)**

Tranopelta huberi FOREL, 1907, Mitth. Naturhist. Mus. Hamburg, XXIV, p. 5, ♀.
?Tranopelta subterranea EMERY, 1919, Bull. Soc. Ent. France, p. 61, ♀.

FEMALE.—Length, about 8–8.5 mm. Mandibles smooth, coarsely punctate. Anterior border of clypeus transverse, broadly sinuous on each side, in the middle scarcely broadly impressed or very feebly concave. Clypeus much less convex than in *gilva*, not carinate. Head transversely rectangular, very broad, nearly one-quarter broader than long, straight posteriorly, somewhat broader than anteriorly, with feebly convex sides. The antennal scapes distinctly surpass the posterior border of the head. All the funicular joints of the 11-jointed antennæ are longer than broad; club precisely as in *gilva*. The mesonotum overarches the pronotum anteriorly. Epinotum with two broad, stout, triangular, rather blunt spines, somewhat more than half as long as the straight declivity, which is about three times as long as the base of the spines. Declivity almost vertical. Anterior slope of petiolar node gently rising anteroposteriorly in the form of a gradual inclined plane, broad behind, with convex sides, longer than broad, posteriorly with two blunt, tooth-like corners. The posterior and at the same time superior border of this flattened segment is almost acute and broadly emarginate between the corners. Thence the surface is short and steep. Postpetiole rounded, somewhat broader than long. The gaster is lacking in the single specimen. Legs rather long and slender; tarsal claws well developed.

Clypeus, cheeks and sides of head as far as the frontal carinæ densely striate and lustrous. Front between the carinæ, vertex, occiput, thorax and petiole smooth, shining and sparsely punctate. Only the epinotum is irregularly rugulose.

Erect pilosity uneven, partly long, sparse, pointed, somewhat oblique on the tibiae, arising from punctures. Appressed pubescence very dilute.

Sordid yellow, in places somewhat brownish yellow; legs paler; antennæ yellowish brown. Mesonotum with three brown longitudinal bands. Ocelli enclosed in a brownish spot. Wings brownish, smoky, with brown veins and stigma; venation precisely as in *gilva* Mayr.

Surinam, Upper Pará (J. Michaelis).

Notwithstanding the great differences, I regard this species as a *Tranopelta*, though it is very distinct from *gilva* Mayr and evidently also from the much larger *mayri* Forel, known only from the male, and is particularly aberrant in its long antennal joints, the epinotal spines and small stature. I dedicate this species to Dr. Huber, director of the Museum Goeldi at Pará, the author of excellent observations on the habits of ants. (Forel)

***Tranopeltoides parvispina*, new species**

FEMALE (Fig. 3d).—Length probably somewhat more than 10 mm., but post-petiole and gaster lacking; length of wings 13 mm.

Head trapezoidal, about one-fifth broader than long, broader behind than in front, with straight posterior and lateral borders. Eyes at the middle of the sides and about one-third their length. Ocelli large, in deep impressions. Mandibles moderately convex, their apical margins with five subequal, rather blunt teeth. Clypeus flattened, its anterior border straight and entire in the middle, sinuate on each side. Frontal area triangular; frontal groove distinct only in the middle of a line connecting the frontal area and the anterior ocellus. Antennæ rather short,



Fig. 3. a, *Tranopeltoides botirianus*, new species, head of male; b, antenna of same; c, wings of same; d, *Tranopeltoides parvispina*, new species, wings of female.

11-jointed, the scapes reaching only to the posterior third of the lateral borders of the head; first funicular joint as long as the three succeeding joints together; joints 2-7 scarcely longer than broad; 8 and 9 a little longer than broad; the terminal as long as the two preceding joints together. Thorax elongate-elliptical, narrower than the head, mesonotum much longer than broad, convex anteriorly where it overarches the pronotum. Epinotum small and short, abruptly sloping, the base very short, scarcely distinct from the flattened declivity, above and at the sides of which there is a pair of small, blunt, triangular, flattened teeth, not longer than broad at their bases and the latter not more than a quarter the length of the declivity; episternal angles very small. Petiole less than twice as long as high; the anterior slope of the node in the form of an inclined plane, the node itself very short, broadly excised in

the middle and with each corner forming an acute angle. The ventral surface bears a small triangular, downwardly directed tooth at the anterior end. Legs moderately long and stout. Venation of wings essentially as in *Tranopelta* but the radial cell is more nearly closed, the cubital cell is shorter and the discoidal cell is larger.

Shining; mandibles striatopunctate; clypeus smooth in the middle, coarsely punctate on the sides. Head above finely, longitudinally striate and with rather coarse, scattered, piligerous punctures. Thorax very smooth and shining above, sparsely and finely punctate; epinotum subopaque, the lower pleuræ very finely and longitudinally, the declivity transversely striate.

Hairs yellow, erect, rather uneven, sparse, longer on the head than on the thorax; suberect and nearly as long on the tibiae as on the thorax; mesosternum and femora with dilute, appressed, yellowish pubescence.

Yellowish brown; head darker, more reddish brown; legs slightly paler; mesonotum with three indistinct, darker longitudinal streaks; mandibular teeth blackish. Wings distinctly yellowish, the veins and stigma brownish yellow.

A single specimen taken August 8, 1911, at Kaieteur, British Guiana, by Dr. F. E. Lutz.

This species is certainly congeneric with the preceding and is distinct in its larger size and in having much shorter antennal scapes, a different sculpture of the head and mandibles and smaller spines on the epinotum.

***Tranopeltoides bolivianus*, new species**

MALE (Fig. 3 a, b, c).—Length, 5.5 mm.

Head, including the eyes, broader than long; both the eyes and ocelli very large, larger than in *Tranopelta*, the latter on an elevated projection. Cheeks absent. Mandibles small, with two acute teeth, the basal minute. Clypeus moderately convex, with straight, entire anterior border. Antennæ slender, very short, 11-jointed; the scape scarcely twice as long as broad, the first funicular joint subglobular, a little broader than long, second joint longer than the scape, remaining joints, except the last, somewhat shorter, terminal joint tapering. Thorax from above broadly elliptical, broader than the head, the mesonotum without Mayrian furrows, convex anteriorly and overarchng the pronotum. Epinotum with subequal base and declivity, meeting on each side at a small but distinct angle which represents the spine of the female. Mesosterna very convex. Petiole unarmed beneath; the node lower, much rounder and not angulate at the posterior corners. Postpetiole somewhat broader than the petiole, nearly as long as broad, campanulate. Gaster shaped much as in *Tranopelta* but the broad, outermost genitalic appendages are more truncated and the pygidium is less acutely pointed. Legs long and slender, tarsal claws large. Wings conspicuously broad, their venation like that of the preceding species.

Smooth and shining, with small, indistinct and scattered, piligerous punctures; mandibles with a few coarse punctures.

Hairs yellowish, rather long, sparse, suberect, covering the body and legs but absent on the flexor surfaces of the tibiae and tarsi, most conspicuous on the gaster. Legs and antennæ also covered with fine whitish pubescence.

Yellowish brown, antennæ and legs paler yellow; space between the ocelli jet black; mandibular teeth and two longitudinal streaks on the mesonotum dark brown. Wings brownish hyaline with yellow veins and stigma.

A single specimen taken by Prof. Nils Holmgren at San Firmin, Bolivia, and loaned by the Royal Museum of Stockholm.

I believe there can be little doubt that this male is congeneric with the two preceding species, of one of which it may represent the missing sex. Another male in my collection seems to be distinct and may be given the following name.

***Tranopeltoides peruvianus*, new species**

MALE.—Length, 5 mm.

Closely resembling the preceding species but honey-yellow, except the black area between the ocelli and the two dark brown streaks on the mesonotum. The wings are also paler, with pale yellow veins and stigma. The angles of the epinotum are obsolete, the petiole and postpetiole are shorter and their nodes more depressed above. The greatest difference, however, lies in the length of the antennal joints, the third to sixth funicular being distinctly shorter than in the Bolivian species and the second funicular distinctly swollen at the base. The eyes are somewhat less convex and the cheeks, though extremely short, are nevertheless perceptible. The long hairs are lacking on the extensor surfaces of the hind tibiæ and there are only a few of them on the fore and middle tibiæ. The oblique or subappressed pubescence on the antennæ, and especially on the legs, is distinctly longer.

A single male from Callanga, Peru, purchased many years ago from Staudinger and Bang-Haas. The terminal joints of both antennæ are missing. This male, too, may perhaps belong to one of the females described above.

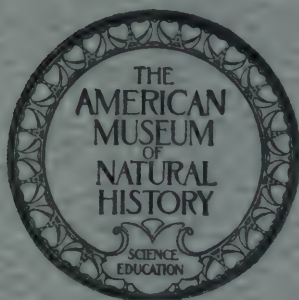
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AMERICAN MUSEUM NOVITATES

No. 49

DIBELODON EDENSIS (FRICK) OF SOUTHERN
CALIFORNIA, *MIOMASTODON* OF THE
MIDDLE MIOCENE, NEW GENUS

BY HENRY FAIRFIELD OSBORN



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DIBELODON EDENSIS (FRICK) OF SOUTHERN CALIFORNIA, *MIOMASTODON* OF THE MIDDLE MIOCENE, NEW GENUS¹

BY HENRY FAIRFIELD OSBORN

During the years 1916–1917, Mr. Childs Frick (1921, p. 279)² conducted field work in southern California as part of Professor John C. Merriam's comprehensive plan for the study of the geologic and faunal history of the Pacific coast. In the rich "Eden beds" were discovered proboscidean remains which the author (*op. cit.*, p. 405) determined as follows:

Trilophodon (*Tetrabelodon*) *shepardi edensis*, n. subsp. *Type specimen*.—The portion of a skull and posterior maxillaries, containing the last molar of the left side and a section of that of the right side, Univ. Calif. Coll. Vert. Pal. no. 23501 (fig. 160); two associated molars from the left and the right side respectively, Univ. Calif. Coll. Vert. Pal. 23503, 23504 (figs. 164, 162); and portions of premaxilla and tusks, Univ. Calif. Coll. Vert. Pal. no. 24047 (pl. 50), all from Univ. Calif. loc. 3269.

The Eden beds are correlated with the Snake Creek of Nebraska, the Rattlesnake of Oregon, the Thousand Creek of Nevada, and the Middle Etchegoin of California, namely, of Middle Pliocene age. Excavation in the Eden beds continued by Mr. Frick resulted in the recovery of the complete upper tusks of one of the cotype specimens which were figured by the author (*op. cit.*, Pl. 50): "Figs. 1 and 2. Portions of premaxillary and tusks of Eden type specimen, no. 24047, $\times \frac{1}{4}$." Under Mr. Frick's direction these cotype tusks have been carefully restored and mounted, as represented in the present article (Fig. 1). Mr. Frick has kindly offered this precious cotype to the present writer for redescription together with newly discovered grinding teeth found in the same ledge of the Eden beds, representing several individuals which probably belong to the same species. This new cotype and the associated material prove that the Eden proboscidean is very close indeed in all its characters to the classic *Mastodon andium* Cuvier of the valley of Tarija, Bolivia, and especially to the skull described by Nordenskiöld³ in 1903.

¹This is the eighth in the author's list of special papers on the evolution and classification of the Proboscidea since 1918, and the eighteenth in his total list of papers on this subject since 1907.

²Frick, Childs, 'Extinct Vertebrate Faunas of the Badlands of Bautista Creek and San Timoteo Cañon, Southern California,' Univ. Calif. Publ. Bull. Dept. Geol., XII, No. 5, pp. 277–424, Pls. XLIII–L, 165 text figures. December 28, 1921.

³Nordenskiöld, Erland, 1903, 'Über die Säugetierfossilien des Tarijatals, Südamerika. I. *Mastodon Andium* Cuv.,' Kungl. Svenska Vetensk.-Akad. Hand., Bd., 37, No. 4, pp. 1–30, Taf. I–VI.

The matter of chief interest and importance is that these notorostriine proboscideans migrated along the western coast of North America EN ROUTE to their habitat in the Andes. The generic name to be applied to this animal is not *Trilophodon* Falconer but *Dibelodon* Cope. Cope (1884)¹ founded *Dibelodon* on three species, namely, *Dibelodon (Mastodon) shepardi* Leidy, *Dibelodon tropicus* Cope, and *Mastodon humboldtii* Cuvier, the first being specified as type. Consequently, *Trilophodon (Tetralodon) shepardi edensis* Frick = *Dibelodon edensis* (Frick).

***Dibelodon edensis* (Frick)**

CHARACTERS.—As shown in Fig. 1, *A*₁, *A*₂, *B*, the premaxillæ, the anterior portion of the palate, the dentition, and the enamel areas of the tusks are so similar to those of the Tarija skull referred to *M. andium* by Nordenskiöld, that if the Eden cotype had been found at Tarija it would without question have been referred to the species *Dibelodon andium*. The enamel ribbon in both the Eden and the Tarija specimens leaves the skull on the OUTER border of the tusk which by an inward rotation on its own axis carries the enamel (*e e e*) to the INNER border; in both photographic figures the enamel borders are artificially indicated with a faint white line. The *Dibelodon edensis* cotype is a male individual, consequently the tusks are more robust; it is a younger individual, hence the tusks are relatively shorter and the twisting of the enamel band does not extend quite so far. It appears probable that *Dibelodon edensis* is less progressive than *Dibelodon andium* in its tusk formation.

The teeth included by Mr. Frick as type and cotype specimens are the following: Posterior maxillæ with left *M*³ and right *M*³, Univ. Calif. 23501 (fig. 160).

Associated molars right *M*² and left *M*², Univ. Calif. 23503, 23504 (figs. 164, 162).

Portions of premaxilla and tusks, Univ. Calif. 24047.

These types give the ridge formula *M* 2³, *M* 3⁴.

New specimens in the American Museum collection from the same Eden ledge referred to *Dibelodon edensis* are the following: *A*. 18219, left *M*³; *B*. 18219, jaw with left *M*₂₋₃; *C*. 18219, palate with well-worn right *M*²⁻³; *D*. 18219, right *M*³; *E*. 18219, right *M*³; *F*. 18219, maxillary with right *M*²⁻³ (frag.); 18218, left *DM*³⁻⁴, *M*¹; 18217, left *M*₃; *B*. 18216, juvenile inferior maxillary with *DI*₂, *DM*₂₋₄, *M*₁. The latter specimen contains a small tusk apparently enamelled.

These referred specimens belong to several different individuals and the determination of the superior and inferior grinding teeth is provisional. The lower jaw with milk incisor (*B*. 18216) is of great interest if it proves to present us with the juvenile characters of the *Dibelodon edensis* jaw, as appears probable.

¹Cope, E. D., 1884, 'The Extinct Mammalia of the Valley of Mexico,' Proc. Amer. Phil. Soc., XXII, pp. 1-21.



Fig. 1. Comparison of rostrum and tusks of female *Dibelodon edensis* of Tarija, Bolivia, and male *Dibelodon andium* of southern California. All figures are reduced to approximately $\frac{1}{4}$ nat. size.

A₁, Superior view of cotype specimen of *Dibelodon edensis* Frick. This is probably a male individual.
 B, Palatal view of "*Mastodon*" *andium* of Tarija, described by Nordenskiöld (1903, p. 26, Taf. I, fig. 2) as a female individual.
 A₂, Palatal view of the same cotype of *Dibelodon edensis* Frick showing the remarkable similarity of detail to the palate of "*M. andium*."
 The spiral course of the enamel bands in both specimens may be observed in all the figures.

Miomastodon, new genus

GENOTYPIC SPECIES.—*Mastodon merriami* Osborn, 1921,¹ from the Virgin Valley formation, Middle Miocene of Nevada.

GENERIC CHARACTERS.—A member of the true Mastodontinæ phylum leading into the *Mastodon americanus* type, distinguished from the true *Palæomastodon beadnelli* of the Lower Oligocene of the Fayûm, Egypt, by rounded, greatly enlarged, upcurved superior tusks; form of inferior tusks not certainly known, probably rounded and more or less encased in enamel; distinguished from the true Pleistocene *Mastodon americanus* by the presence of a broad enamel band extending from the base to the summit of the tusk. Ridge formula: $M\ 2\ \frac{3}{8}$, $M\ 3\ \frac{3\frac{1}{2}}{4}$, as compared with the *Palæomastodon beadnelli* ridge formula: $M\ 2\ \frac{2\frac{1}{2}}{3}$, $M\ 3\ \frac{2\frac{1}{2}}{3}$; as compared with the *Mastodon americanus* ridge formula: $M\ 2\ \frac{3}{8}$, $M\ 3\ \frac{3}{4\frac{1}{2}}$.

To this genus may at present be referred four species, namely: Genotypic species, *Mastodon merriami*, Middle Miocene, Nevada = *Miomastodon merriami*

Mastodon proavus Cope, 1873, late Middle Miocene, Pawnee Creek, Colorado = *Miomastodon proavus*

Mastodon matthewi Osborn, 1921, Middle Pliocene, western Nebraska = *Miomastodon matthewi*

Also probably *Mastodon tapiroides americanus* Schlesinger, Lower Pliocene of Hungary = *Miomastodon tapiroides americanus*.

The distinctive grinding tooth characters in all these Mastodontinæ are: (1) that each loph (protoloph, metaloph, *et seq.*) is composed of a main internal and external bunoid cone; (2) the intermediate conule region does not develop; (3) the earliest grinder is tetrabunodont; (4) as the third loph is added it becomes hexabunodont; (5) as the fourth loph is added it becomes octobunodont; (6) whereas these four, six, and eight cones heighten (hypsodonty), they never unite transversely into a crest; thus none of the Mastodontinæ becomes zygolophodont.

The broad enamel band of the tusks is apparently placed on the CONCAVE surface of the tusk in *Miomastodon merriami*, on the CONVEX surface of the tusk in *Miomastodon tapiroides americanus*.

The occurrence of *Miomastodon merriami* in the Virgin Valley, Nevada, in Middle Miocene time demonstrates that these true mastodons arrived in this country much earlier than we have hitherto supposed. It is probable that the so-called "*Mastodon*" *proavus* of Cope from the Middle Miocene of Pawnee Creek, Colorado, is another representative of the genus *Miomastodon*; on the other hand, "*Mastodon*" *brevicens* Cope, 1889, from the late Middle Miocene, from the Deep River beds of Montana, probably belongs to the genus *Rhynchotherium*, distinguished by short molar teeth (hence *R. brevidens*) and internal lobes bearing trefoils on crests one and two.

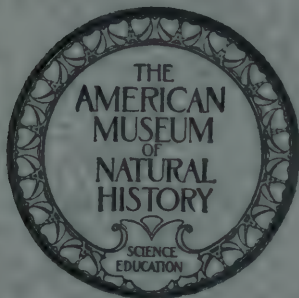
¹Osborn, H. F., 'First Appearance of the True Mastodon in America,' Amer. Mus. Novitates, No. 10, June 15, 1921, pp. 1-6, Figs. 1 and 2.

AMERICAN MUSEUM NOVITATES

No. 50

CARANGOIDES JORDANI FROM THE HAWAIIAN ISLANDS WITH NOTES ON
RELATED FISHES

By JOHN TREADWELL NICHOLS



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CARANGOIDES JORDANI FROM THE HAWAIIAN ISLANDS WITH NOTES ON RELATED FISHES

BY JOHN TREADWELL NICHOLS

In the summer of 1921, Dr. David Starr Jordan, of Stanford University, made a collection of fishes in the Hawaiian Islands, the locality where I had had the pleasure of first meeting him twenty years previous. A series of this material was to come to The American Museum of Natural History. As I had been making an especial study of the subfamily Caranginae, all the carangids were courteously sent here to be worked up. The following notes are placed on record as a contribution to a knowledge of certain of these forms and of the Hawaiian fish fauna.

Decapterus maruadsi (Temminck and Schlegel)

The collection contains two specimens (300 and 305 mm. in length to base of caudal) of this species, previously known from Japan and China coasts. They are at once recognizable as distinct from *Decapterus macarellus pinnulatus*, the common form in Hawaiian waters, by greater depth, longer pectoral, and greater development of scutes. It is not surprising that *Decapterus maruadsi* is common to the western and central Pacific, for the other Pacific species of *Decapterus* is also found in Japan, though there provisionally recognized as a distinct race, *muroadsi*. We have no Japanese *maruadsi* material available for comparison with these Hawaiian specimens. The larger (305 mm.) specimen has the following measurements:

Depth in length to base of caudal, 4.5 (in length to notch of caudal, 4.7); head, 3.9; eye in head, 3.5; snout, 3.0; maxillary (which barely reaches front of eye), 3.0; pectoral (which is pointed), 1.2; thickness of body, 1.8. Teeth are minute but evident. Dorsal has about 34 soft rays; anal 28. The straight part of the lateral line is contained 1.5 in the arc of the low curve. The scutes are traceable forward for almost the entire length of the straight part of the lateral line, and number about 36. A conspicuous black spot at the angle of the opercle.

Caranx affinis lundini (Jordan and Seale)

Caranx affinis Jordan and Evermann, 1905, 'Fishes Hawaiian Islands.'

Decapterus lundini Jordan and Seale, 1906, 'Fishes of Samoa.'

Six specimens 130 to 200 mm. standard length (to base of caudal) have been compared with two, 179 to 182 mm., from Somaliland (Barnum Brown, Collector). These latter, which presumably are true *C. affinis* Rüppell, with type from the Red Sea, have appreciably smaller teeth, forming a broader band, where they cease to be uniserial in the front of the jaw, have more pointed heads, and are less compressed, thus agreeing with the figure and description of *affinis* in Day, 1889, 'Fauna British India,' Fishes. The Hawaiian fish, however, is exceedingly close to *affinis* if specifically distinct.

***Caranx cheilio* (Snyder)**

One 400 mm. long to base of caudal has been compared with a smaller (270 mm.) specimen of *C. guara* from Bermuda. The two species are close, a slightly shorter dorsal in *cheilio* (24 versus 26 soft dorsal rays) the most obvious technical distinction. *Cheilio* has back more elevated, profile steeper, ventral outline more horizontal, lips thicker, eye nearer snout instead of in the center of head.

***Carangoides jordani*, new species**

Carangoides ferdau Jordan and Evermann, 1905, 'Fishes of Hawaiian Islands,' p. 198, fig. 77. Not *Scomber ferdau* Forskal.

The type, No. 8104, American Museum of Natural History, Hawaiian Islands, 1921, D. S. Jordan, is 200 mm. long to base of caudal. Villiform teeth on palate and in bands on jaws; arch of lateral line low, its arc 1.1 in straight part; scutes small, restricted to posterior portion of straight part, about 30.

Depth, 2.4 in length; head, 3.5. Eye, 4.4 in head; maxillary, 2.4; dorsal lobe, 1.0; anal lobe, 1.5; pectoral, 1.0. Maxillary to under front of orbit, not reaching pupil. Gill-rakers 23 on lower limb of first arch. Height of anterior lobe of soft dorsal 1.4 in base of that fin (not following curve of back), 1.3 in depth of body. Dorsal soft rays 30, anal 27. Chest before the ventrals scaleless, the naked area widening as it reaches gill-covers. Color in alcohol bluish plumbeous, paler below, fins dark gray, darkest on dorsal and anal lobes.

Two specimens, 200 mm. in length to base of caudal, are identical with *Carangoides ferdau* Jordan and Evermann, which differs from *ferdau* of Forskal in the larger number of fin rays (dorsal soft rays 29 to 30, anal 25 to 27), and differs from *C. gymnostethoides evermanni* in the character of the lobe of the soft dorsal which ends in a slender filament and is contained 1.4 to 1.6 times in the base of that fin, 1.3 to 1.4 in depth of body. It is more slender than *Carangoides gilberti*, with differently shaped body and fins.

Carangoides gymnostethoides evermanni Nichols

A specimen referred to this form is somewhat larger (330 versus 313 mm. to base of caudal) than the type, with which it has been compared (see 1921, American Museum Novitates, No. 3). It agrees closely with same in most respects, and differs from it in being less compressed, thickness 1.7 versus 2.0 in head. The dorsal lobe is shorter 1.5 versus 1.4 in head, 2.5 versus 2.0 in base of fin; maxillary just reaches front of pupil; and the naked area on chest broadens more anteriorly, where it meets the gill-covers.

This individual is not differentiable from *orthogrammus* by higher dorsal lobe, but is less slender than the description of that fish, depth 2.7 versus $3\frac{2}{3}$.

Alectis ciliaris (Bloch)

One, $19\frac{1}{4}$ inches long to base of caudal, is the largest that the writer has ever had the pleasure of examining. A table of the variations of this species with size will be found on page 287, XLII, Bulletin, American Museum of Natural History (J. T. Nichols, 1920). The following measurements of this large individual (which has one of two dorsal filaments extending to beyond caudal, an anal filament to caudal base, and lacks dark cross-bands) carry on, in a manner to be expected, the proportional changes with growth indicated by smaller material. Thus depth in length is 2.1; eye in head 3.8; snout 2.8; pectoral 0.8; ventral 2.1. The curve of the lateral line in straight part, 1.0, does not show the anticipated change; but the most surprising condition is found in the gill-rakers, 17 in number, but the most anterior, and also the only one well on the upper limb of the arch, rudimentary, as though they might be dropped out in still further growth. If gill-rakers are dropped out by growth, *Alectis ciliaris* might easily become *Alectis hopkinsi* in reaching 26 inches, the size of the unique type of that species (*loc. cit.*, p. 291).

AMERICAN MUSEUM NOVITATES

No. 51

REVISION OF *PALÆOMASTODON* AND
MERITHERIUM.

PALÆOMASTODON INTERMEDIUS, AND
PHIOMIA OSBORNI, NEW SPECIES

By H. MATSUMOTO



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REVISION OF *PALÆOMASTODON* AND *MÆRITHERIUM*.

PALÆOMASTODON INTERMEDIUS, AND *PHIOMIA* *OSBORNI*, NEW SPECIES

By H. MATSUMOTO

This communication is a preliminary abstract of results reached in the author's researches during the year 1921 on the American Museum collections of *Palæomastodon*, *Phiomia*, and *Mæritherium*, in comparison with the type collections in the British Museum which were described by Charles W. Andrews between 1901 and 1906. The abstract was prepared from Dr. H. Matsumoto's MS. by Dr. Charles C. Mook, August, 1922. The full paper will appear in the American Museum Bulletin.

I.—*PALÆOMASTODON*, *PHIOMIA*

The genus *Palæomastodon* should be subdivided into two genera as follows:

- A. Palate wide in proportion to the length of cheek teeth series. Symphysis rather short, its posterior end lying at a considerable distance anterior to the anteriormost cheek tooth (P_3); the most conspicuous one of the anterior mental foramina lying just below the anteriormost cheek tooth, as well as a considerable distance behind the posterior end of the symphysis.

$$\text{Ridge formula: } Dm \frac{???}{???}, P \frac{1.1.2}{1+.2}, M \frac{2+ 2+ 2+}{2+ 2+ 2-3+}$$

Last premolars and all molars bunolophodont, appearing like typically lophodont teeth when moderately worn; no trefoil pattern of cusps

= *PALÆOMASTODON* Andrews.

Genotype: *Palæomastodon beadnelli* Andrews, 1901.

- B. Palate long and narrow. Symphysis long, its posterior end lying only a little anterior to or posterior to the anterior end of the anteriormost cheek tooth (P_3); the most conspicuous one of the anterior mental foramina lying far anterior to the anteriormost cheek tooth, as well as to the posterior end of the symphysis.

$$\text{Ridge formula: } Dm \frac{1.2.3}{1.2.3'}, P \frac{1.1-1+.2}{1+. 2}, M \frac{3.3.2+-3}{3.3.3-3+}$$

Last premolars and all molars typically bunodont; trefoil pattern of cusps well developed..... = *PHIOMIA* Andrews.

Genotype: *Phiomia serridens* Andrews and Beadnell, 1902.

***Palæomastodon parvus* Andrews, 1905**

Andrews, 1905, Geol. Mag., Dec. V, N. S., II, pp. 562, 563.

Type fig.: Andrews, 1906, 'Descr. Cat. Tertiary Vertebrata of Fayûm, Egypt,' p. 163, fig. 55.

American Museum specimens: No. 13497 from Fluvio-marine formation.

***Palæomastodon intermedius*, new species**

Type: American Museum No. 14547; fragment of left mandibular ramus, bearing all three molars *in situ*, with parts of alveoli of penultimate and last premolars.

Paratype: American Museum No. 13480; a fragment of left mandibular ramus bearing last molar and posterior root of penultimate molar *in situ*.

American Museum referred specimens: Nos. 13449, 14548.

All from Fluvio-marine formation.

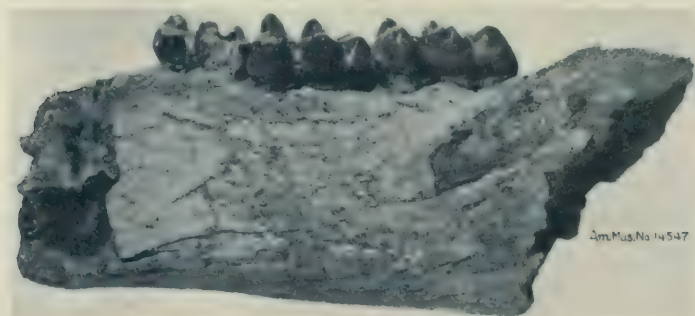
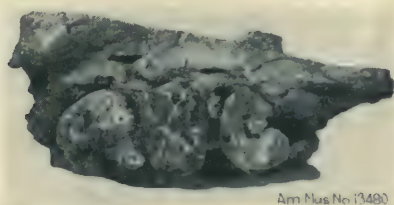


Fig. 1. Type specimen of *Palæomastodon intermedius*, new species. Matsumoto. Amer. Mus. No. 14547, Fayûm Collection. Slightly over one-fourth natural size.

The palate of paratype specimen of *Palæomastodon intermedius*, No. 13499, measures as follows:

Length from the frontal plane tangential to the anterior limits of the crowns of the two P ² to the tip of the posteriorly directed process at the posterior limit of the median suture between the two palatines.	250 mm.
Distance between the two P ²	53 mm.
Distance between the two M ¹	77 mm.
Distance between the two M ³	75 mm.

All the upper molars are distinctly bilophodont, as a generic character; the rudiment of the third ridge being much feebler and much less conspicuous than that of the lower molars. The mode of wearing corresponds well to what is stated of the lower molars. Besides, all the generic characters of all the cheek teeth of this species are the same as those stated in the diagnosis of the genus.



Am Mus No 13480

Fig. 2. Paratype specimen of *Palæomastodon intermedius*, new species. Amer. Mus. No. 13480, Fayûm Collection. Slightly over one-third natural size.

Palæomastodon beadnelli Andrews, 1901

Andrews, 1901, Tagebl. d. V, Intern. Zool. Congress, Berlin, No. 6, p. 4.

Type fig.: Andrews, 1901, Geol. Mag., Dec. IV, N. S., VIII, text fig. 1, A, B, p. 401.

American Museum referred specimen: No. 13481.

Phiomia (minus) minor Andrews, 1904

(*Palæomastodon beadnelli* Andrews, 1901; *Pal. barroisi* Pontier, 1907.)

Andrews, 1904, Geol. Mag., Dec. V, N. S., I, p. 115.

Type fig.: 1906, Pl. XIV, figs. 1, 1A, text fig. 50D.

American Museum referred specimens: Nos. 13469, 13471, 13475, 13483, 13486, 13448, 13455, 13461, 13464, 13465, 13467.

Phiomia wintoni Andrews, 1905

(*Phiomia serridens* Andrews and Beadnell, 1902; *Palæomastodon beadnelli* Andrews, 1901; *Pal. wintoni* Andrews, 1905; *Pal. barroisi* Pontier, 1907.)

Andrews, 1905, Geol. Mag., Dec. V, N. S., II, p. 563.

"The paratype (Andrews' fig. 3) of *Phiomia serridens* is merely a hyracoid, as subsequently referred to by Andrews himself."

Type fig.: Andrews, 1906, p. 157, fig. 53.

American Museum referred specimens: Nos. 13470, 13474, 13476, 13477, 13484, 13485, 13494, 13450, 13451, 13452, 13453, 13454, 13456, 13457, 13458, 13459, 13460, 13479, 13482, 13488, 13489, 13491, 13492, 13493, 13327, 13463, 13466.

Phiomia osborni, new species

Type: American Museum No. 13468; a nearly complete mandible, bearing all the teeth *in situ*.

Type fig.: Fig. 3 of this paper.



Am Mus No 13468

Fig. 3. Type specimen of *Phiomia osborni*; new species. Amer. Mus. No. 13468, Fayûm Collection. One-fifth natural size.

. This species, *Phiomia osborni*, appears to be more progressive than *Phiomia minor* and *Phiomia wintoni* in the better developed posterior ridge of the first and second lower molars and in the better developed posterior talon of the last lower molar; and to be more archetypal than the same in the more gradual increase in size posteriorly of the lower cheek teeth.

II.—MÆRITHERIUM

Genotype: *Mæritherium lyonsi* Andrews, 1901

Andrews distinguishes three species of *Mæritherium*:

M. lyonsi Andrews, 1901. Large form from Qasr-el-Sagha. Matsumoto does not specify a type but gives dimensions of Andrews' specimen, Geol. Mag., Dec. IV, N. S., VIII, pp. 403-405, fig. 2, p. 403. Some of the dimensions are estimated from Andrews' figures.

M. gracile Andrews, 1902. Small form from Qasr-el-Sagha formation. (Geol. Mag., Dec. IV, N. S., IX, p. 292.)

Type fig.: Andrews, 1906, Pl. xvii, figs. 1, 2.

M. (trigodon) trigonodon Andrews, 1904. Small form from Fluvio-marine formation. (Geol. Mag., Dec. V, N. S., I, p. 112.)

Type fig.: Andrews, 1906, Pl. ix, fig. 5.

Schlosser divided Andrews' *M. lyonsi* into *M. lyonsi*, restricted, large form from the Qasr-el-Sagha formation, and *M. andrewsi*, large form from the Fluvio-marine formation.

He considered the small forms to be based upon sexual characters only. Matsumoto considers that the name *M. trigodon* has precedence of *M. andrewsi*.

Matsumoto identifies in the American Museum material:

1. Large form from Qasr-el-Sagha formation, part of No. 13444.

Mæritherium lyonsi Andrews, 1901.

2. Small form from Qasr-el-Sagha formation, No. 13443, part of 13444, 13445, 13446. *Mæritherium gracile* Andrews, 1902.

3. Large form from Fluvio-marine formation.

Type fig.: Andrews, 1906, Pls. VIII, IX. Specimens provisionally referred to *M. lyonsi*.

American Museum Nos. 13432, 13437.

Mæritherium andrewsi Schlosser, 1911.

4. Small form from the Fluvio-marine formation, Nos. 13430, 13431, 13433, 13435, 13436, 13439. (Andrews, 1904, Geol. Mag., Dec. V, N. S., I, p. 112.)

NOTE BY HENRY FAIRFIELD OSBORN, August, 1922.—(1) The significance of the above revision is that the true *Palæomastodon beadnelli* has bilophodont intermediate molars and a relatively broad skull; it is a rare animal both in the British Museum and American Museum collections; according to Andrews (1922) the genotype (*Palæomastodon beadnelli*) was found at the very base of the Fluvio-marine Beds, Lower Oligocene, 50 or 100 feet BELOW the *Phiomia* level. The original type specimen was destroyed in the Custom House at Cairo, but the type is fortunately now represented by the British Museum cast. Associated with the type is a very large femur and humerus.

(2) *Phiomia*.—The various specimens of *Phiomia* were found 50 or 100 feet ABOVE the type level of *Palæomastodon beadnelli*; the genotype (*Phiomia serridens*) is a very immature specimen close in size to the type of *Phiomia minor* which may be a synonym; the genotype is validated by an immature milk tooth specimen of a slightly larger animal. *Phiomia* is a very long-jawed animal, with trilophodont intermediate molars, whereas *Palæomastodon* is a relatively short-jawed animal, with bilophodont intermediate molars.

(3) Matsumoto's revision of these genera conforms to Andrews' observations of 1905, p. 562: "The species of *Palæomastodon* fall into two sections, in one of which the posterior end of the symphysis of the mandible is situated considerably in front of the level of the anterior premolar, while in the other it is only very little in front of that point. The first group, moreover, is distinguished by the comparative simplicity of the molars, in which the accessory cusps are scarcely at all developed, and by the small size of the talon of the last lower molar; into this subdivision the original species, *P. beadnelli*, falls, together with a much smaller form for which the name *P. parvus* is now proposed. The type-specimen of this new species is the right ramus of the mandible, with the premolars and molars *in situ*, though somewhat crushed."

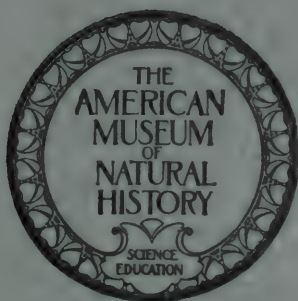
Dr. Andrews has also kindly reviewed the matter (letter July, 1922), and while he does not specifically confirm Matsumoto's revision, he does not offer to dissent from it.

AMERICAN MUSEUM NOVITATES

No. 52

AËROLITE FROM ROSE CITY, MICHIGAN

BY EDMUND OTIS HOVEY



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AÉROLITE FROM ROSE CITY, MICHIGAN

BY EDMUND OTIS HOVEY

At about eleven o'clock in the evening of October 17, 1921, a meteor was seen to pass through the sky from N.N.W. to S.S.E. over the northeastern portion of the Lower Peninsula of Michigan. Near Rose City, Ogemaw County, it exploded with the usual accompaniment of several loud reports, and three of the fragments into which it burst have been recovered on the premises of Mr. George Hall about nine miles northeast of this little hamlet, which gives its name to the fall. These portions are stated to have weighed about $3\frac{1}{4}$ pounds (1.47 kg.), 7 pounds (3.18 kg.) and 14 pounds (6.36 kg.) when obtained. They are now the property of Mr. P. W. A. Fitzsimmons of Detroit, Michigan, to whom I am indebted for the opportunity of describing the largest mass. The weight was not checked up on receipt of the specimen, but after sectioning and removal of a fragment for chemical analysis the material weighs twelve pounds (5443 gm.) and it is supposed that the original weight of this mass was not more than about twelve pounds ten ounces (5726 gm.).

The fragment in hand is roughly ovoid in shape and is about 225 mm. by 167 mm. by 136 mm. in dimensions. The color of the exterior is black and that of the interior as shown in section is also black. A side view is given in Fig. 1 and an end view in Fig. 2. On all sides the surface is deeply pitted. The skin due to superficial melting while passing through the earth's atmosphere is well developed but does not possess a brilliant luster. This skin extends into the pits or depressions but is less in evidence or is wanting on the knobs which also characterize the exterior of the mass. These knobs are the protruding parts of small masses, like the pebbles in a conglomerate, which are cemented together to form the main mass. The fragment here described is reported to have fallen about forty feet south of Mr. Hall's house and to have buried itself about two feet in soft, sod-covered earth. It was found the day after it fell. When first examined by the writer, many of the pits in its surface contained grass, grass roots, and soil firmly wedged into them. The grass was not burned or even charred, and therefore it is evident that the temperature of the mass when it struck the ground was not elevated.

The second largest piece (3.18 kg.) was found later in the same day about 150 feet from the house, near a highway and not so deeply imbedded in the ground as the previous mass.

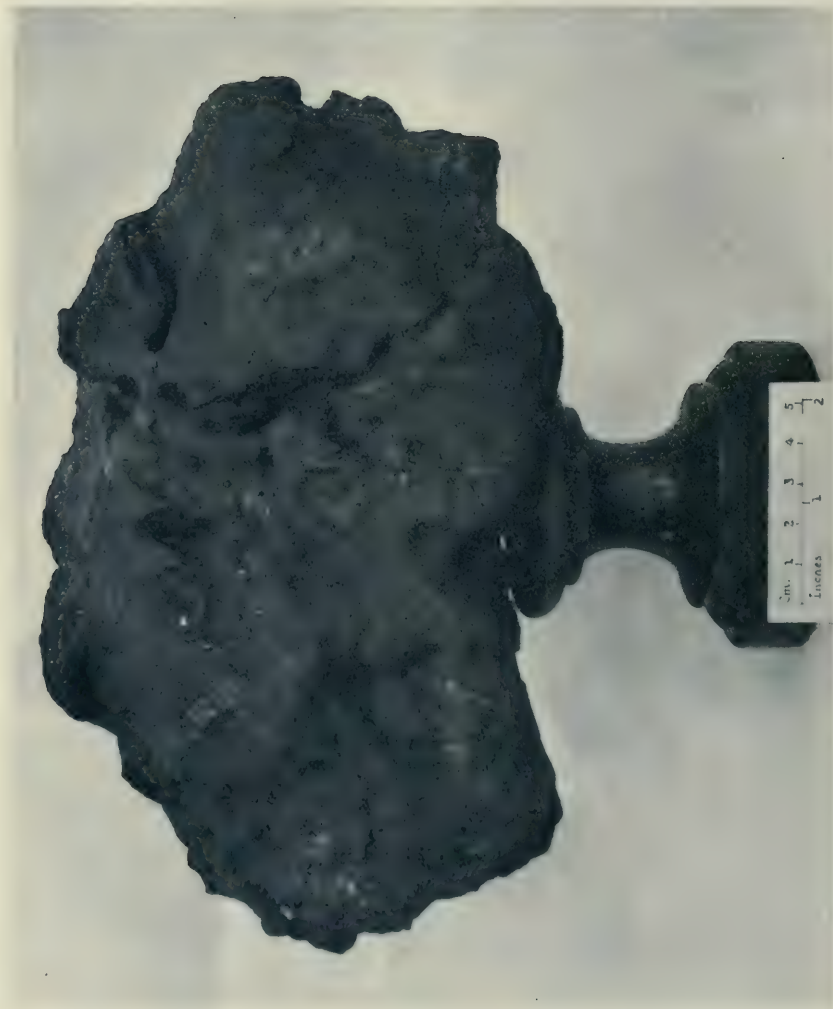


Fig. 1. Rose City, Michigan, Aërolite
Side view, showing agglomeratic character of the fragment and deep pitting due to melting along zones of cementation.

The appearance of a longitudinal section of the largest mass, the one studied, is shown in Fig. 3. Small particles of nickel-iron are numerous and are scattered uniformly through the areas which are cross sec-



Fig. 2. Rose City, Michigan, Aërolite
End view.

tions of the surface knobs. Many of these particles are triangular or approximately triangular in outline, as shown in the section. Others are spongy and irregular. All enmesh portions of the silicate groundmass. The metal is likewise concentrated in long stringers between these



Fig. 3. Rose City, Michigan, Aërolite

Section lengthwise of the mass, showing agglomeratic structure, the zones of dense cementing material and the distribution of the particles of iron.

areas or along portions of the knobs, and many of the stringers are approximately parallel in position. These stringers or larger areas of iron are porous or spongy in texture and contain silicate groundmass within them. Treatment with 5% nitric acid was negative as to the production of Widmanstätten figures, but the iron, by the triangular outline of many of its particles and by their linear arrangement, suggests the presence of octahedral crystalline structure.

The agglomeratic character of the mass which is suggested by its external appearance is still more evident in the section. The somewhat rounded secondary masses are cemented together by finer-grained, denser meteoritic material which seems to be lacking in metallic particles. This material does not seem to be glassy in character. In many places the junction line between secondary masses and matrix is accentuated by stringers of iron. These stringers, of course, are the edges of areas of metal partly covering the surfaces of the secondary masses. In one instance at least the dense cementing material is seen entirely surrounded by iron. This area is shown near the left-hand point in Figure 3. In the section, crevices are seen to have developed in several places along the edges of the secondary rounded masses, showing that these are zones of weakness. Examination of the exterior shows that the pitting caused by surface melting during the passage of the meteorite through the earth's atmosphere has gone most deeply into the zones of cementing material or matrix. This shows that this matrix is more fusible, or at any rate less resistant to fusion, than are the large pebble-shaped bodies or knobs which I have called the secondary masses. These zones of matrix seem to have been the lines along which the rupture of the main meteorite took place. One of these lines of near rupture is shown in Figure 3.

The large pebble-shaped knobs or secondary masses which make up the major portion of the meteorite present numerous angular cavities ranging from 0.1 mm. or less to 0.5 mm. or more in diameter. These seem not to be oriented in position, but in places they are aggregated together so that the rock is somewhat porous in texture. They correspond to the miarolitic cavities occurring in some terrestrial rocks and they are bordered by or have projecting into them minute crystals of iron and silicates. The silicate crystals are apparently enstatite or olivine. Some larger irregular cavities also occur. One cavity oval in outline and 5 mm. in length was observed. One end of this cavity is in dense iron which, with the cavity, forms a pear-shaped area 9 mm. long and 5 mm. in greatest width. This appears in Figure 3.

Under the microscope the major part of the silicate portion of the meteorite is seen to be composed of enstatite and olivine, the former predominating. Both of these minerals are light in color, indicating a low content of iron. The olivine is in grains with rounded outlines and also in subcrystalline development. It is much fractured. The enstatite is very slightly pleochroic. The mass does not appear to be chondritic in structure, but here and there the enstatite occurs in small subspherical aggregates with excentric radial structure. One such aggregate is 1.5 mm. by 2 mm. in diameter. Another shows the laths of enstatite arranged in parallel position. The thin section shows an abundance of minute particles of opaque black matter (chromite?) scattered through it. Some of these are without apparent orientation, others are arranged in dendritic growths associated with the enstatite, and still others are grouped in parallel position in the grains of olivine. Minute nodules of troilite, which are easily recognized by their brassy luster, occur.

There are also irregular areas of a substance of very low relief that would be classed as glass, except that it seems to possess a very slight birefringence.

The presence of anorthite is indicated by the chemical analysis, but the mineral has not been recognized under the microscope.

The chemical analysis was made by Mr. J. Edward Whitfield of Philadelphia, on a fragment weighing about forty-five grams, from one of the knobs which seemed to show a good average distribution of metallic iron but no large areas of the metal. Mr. Whitfield's report is as follows:

Separation was made by use of an electro magnet which gave the mineral portion free from metal, but the metallic particles held back mineral that had to be subsequently separated.

Mineral.....	82.75%
Metal.....	17.25

The metallic composition is:—

Iron.....	90.510%
Phosphorus.....	0.245
Sulphur.....	0.275
Nickel.....	8.570
Cobalt.....	0.400

There were no indications of troilite or schreibersite in the clean metal.

The mineral portion has the following composition:—

Silica.....	SiO_2	43.71%
Alumina.....	Al_2O_3	3.44
Chromium Oxide.....	Cr_2O_3	0.61
Phosphoric Acid.....	P_2O_5	0.25
Ferrous Oxide.....	FeO	15.09
Ferric Oxide.....	Fe_2O_3	None
Calcium Oxide.....	CaO	3.14
Magnesium Oxide.....	MgO	26.97
Manganous Oxide.....	MnO	0.36
Nickel Oxide.....	NiO	0.57
Cobalt Oxide.....	CoO	0.08
Soda.....	Na_2O	1.13
Potash.....	K_2O	0.18
Sulphuric Anhydride.....	SO_3	0.68
Ferrous Sulphide.....	FeS	3.88

100.09%

Search was made for oldhamite and lawrencite with negative results. The ferrous sulphide (troilite) was all found with the mineral portion, as the electric current through the magnet was kept low.

The original composition of the meteorite, therefore, would be:

Silicates.....	78.87%
Metal.....	17.25
Troilite.....	3.88

Specific gravity, taken on the finely pulverized material, 3.694.

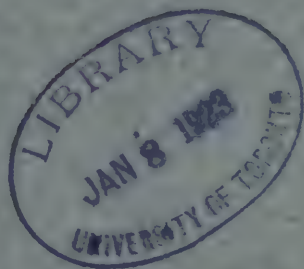
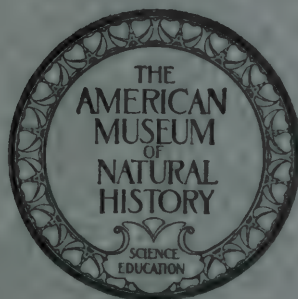
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AMERICAN MUSEUM NOVITATES

No. 53

NOTES ON THE TYPE OF *HESPEROPITHECUS*
HAROLDCOOKII OSBORN

BY WILLIAM K. GREGORY AND MILO HELLMAN



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NOTES ON THE TYPE OF *HESPEROPITHECUS HAROLD-COOKII* OSBORN

BY WILLIAM K. GREGORY AND MILO HELLMAN

Through the courtesy of Professor Osborn, who has recently described¹ the type of *Hesperopithecus haroldcookii*, we have had the opportunity of making further studies upon this already famous specimen, the results of which are submitted below.

ANALYSIS OF CHARACTERS OF THE TYPE

A careful consideration of the characters afforded by the badly eroded and worn type, an upper molar, leads us to distribute them under the following categories.

I.—CHARACTERS DUE TO LONG EXPOSURE TO WEATHERING, EROSION AND STREAM OR WIND ACTION

- (a) Extreme rounding of all angles margins, ridges, and projections of crown and roots.
- (b) Breaking off of postero-external (disto-buccal) root and smoothing of site of root.
- (c) Loss of enamel on entire external and half of posterior surface.
- (d) Presence of numerous large and small cracks and fissures and rounding of the margins of the cracks, causing them to simulate the natural fissures between cusps.

II.—CHARACTERS DUE TO EXTREME NATURAL WEAR OF THE CROWN

- (a) Extreme shortness or apparent brachyodonty of crown and loss of all main cusps.
- (b) Close apparent approximation of hypocone to protocone.
- (c) Evenly concave wearing surface.
- (d) Deposition of secondary dentine on roof of pulp cavity, beneath wearing surface.
- (e) Diminished size of root canals.

III.—CHIEF DIAGNOSTIC CHARACTERS OF *Hesperopithecus* TYPE

- (a) Upper molar crown conforming to the general type that is common to the anthropoids and man.
- (b) Evenly concave masticating surface, as in *Pithecanthropus*, certain chimpanzees¹ and Australian aborigines.

¹Osborn, Henry Fairfield, 1922, '*Hesperopithecus*, the First Anthropoid Primate Found in America,' American Museum Novitates, No. 37. 5 pp., 3 figs. (reprinted without figures in Science, LV, pp. 463-465, May 3, 1922).

²vide G. S. Miller, in *litteris*.

- (c) Very large divergent roots, a primitive character retained in the gorilla, in *Pithecanthropus*, and in certain human teeth.
- (d) Transverse diameter of antero-external root smaller than in human molars.
- (e) Floor of pulp-cavity raised well above bifurcation of roots, as in man (Fig. 5).
- (f) Form of floor of pulp-cavity resembling that of anthropoids and man.

REMARKS ON FIGURES 1 TO 4

FIGURE 1

The crown of the *Hesperopithecus* molar was worn down by use nearly to the base, so that the cusps had entirely disappeared. After death the tooth was badly cracked, battered and waterworn. The cracks and rounded edges are due to these processes.

The upper row of figures shows that the occlusal surface of the *Hesperopithecus* molar is more or less intermediate in contour between m^3 and m^2 of the chimpanzee.

In the middle row the rounding of the antero-buccal edge of the crown is probably due to extreme wear and subsequent erosion; so also the bluntness of the root ends. The enamel on the lingual surface, unlike that of the chimpanzee here figured, is not reflected toward the root along the neck of the tooth. The lingual root (1) was extremely robust.

In the lower row we see the site of the postero-external (disto-buccal) root, which has been broken off, and the site subsequently smoothed down by erosion.

FIGURE 2

In *Hesperopithecus* the antero-external (mesio-buccal) root is very large. The site of the missing postero-external root is also shown, as well as the buccal aspect of the lingual root. The deep fissures and cracks are probably due to erosion.

In the middle and lower rows the great width of the lingual root in *Hesperopithecus* is well shown. The lower row shows the site of the missing postero-external root and the deep groove on the buccal side of the lingual root. The great antero-posterior width of the lingual root, as well as the extreme wear of the occlusal surface, indicates that the tooth is an m^2 or m^1 rather than an m^3 .

FIGURE 3

The evenly concave wearing surface of the *Hesperopithecus* molar is seen to resemble that of *Pithecanthropus*.¹ In the upper row we note the

¹Dr. Miller informs us that he finds nearly the same condition in certain chimpanzees, and we find it also in a gorilla and in Australian aborigines and American Indians.

far greater antero-posterior diameter in *Pithecanthropus*, which has a very large hypocone.

The righthand figures in the upper and middle rows represent the second upper molar of an American Indian, which has been artificially ground down to near the base of the crown. The appearance of this tooth indicates that the rounding of the edges in *Hesperopithecus* may be due to erosion, since similar erosional features have been produced experimentally in the modern tooth. Secondly, it shows the rapid lessening of the antero-posterior diameter of the inner or lingual side of the tooth near the base of the crown.

The middle row shows the doubling of the antero-external (mesio-buccal) root in *Pithecanthropus* and the extreme divergence of its inner and outer roots. In *Hesperopithecus* the lingual root is much wider transversely than that in the human molar and the antero-external root is narrower. The lack of a sharp reflection of the enamel toward the lingual side is seen also in the human molars here figured.

The lower row shows well the even concavity of the wearing surface in *Hesperopithecus* and *Pithecanthropus*. The divergence of the lingual and buccal roots is greater than that in the human molar figured.

FIGURE 4

In the upper row we see the doubling of the antero-external root in *Pithecanthropus*, this root being single in *Hesperopithecus* and in the human tooth here figured. The grooving of the lingual root in *Hesperopithecus* is well shown, also the markedly asymmetrical contour of the crown as seen from above. This view especially, together with Fig. 2, lower row, affords evidence that the type specimen of *Hesperopithecus* is an upper molar of a member of the anthropoid-man group.

In the middle row considerable resemblance to the second upper molar of *Pithecanthropus* and to the first upper molar of an American Indian is shown.

In the lower row the Indian molar (m^2), which had been artificially ground down to near the base of the crown, is compared with the unground but worn second molar of the opposite side. Compare Fig. 3, upper row, with remarks above.

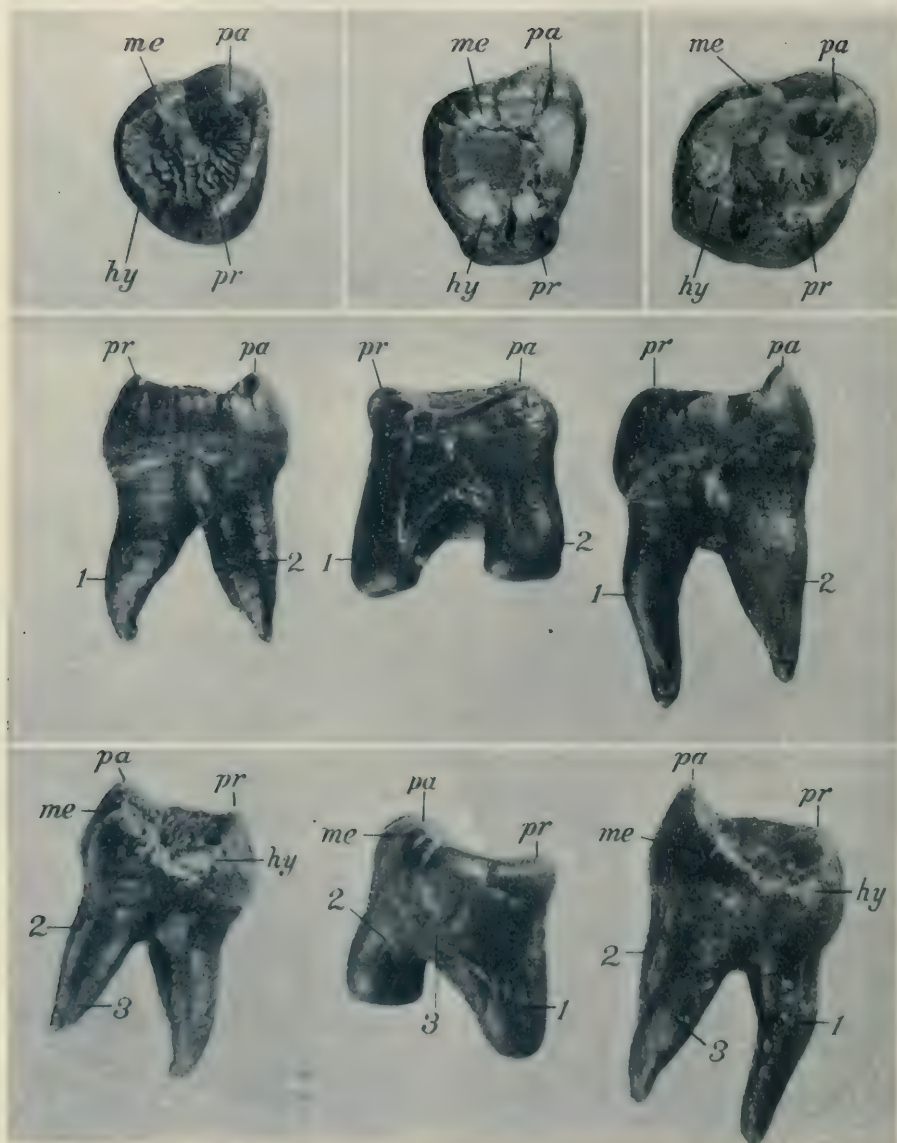


Fig. 1. Comparative figures of upper molars of *Hesperopithecus* and modern chimpanzee (*Pan schweinfurthii*), $\times 2$.

Upper row: occlusal aspect, third upper molar of chimpanzee, second (?) upper molar, type of *Hesperopithecus*, second upper molar of chimpanzee.

Middle row: anterior (mesial) aspect of same specimens.

Lower row: posterior (distal) aspect.

Pr, protocone (mesio-lingual cusp); *pa*, paracone (mesio-buccal); *me*, metacone (disto-buccal); *hy*, hypocone (disto-lingual). 1, lingual root; 2, antero-external (mesio-buccal) root; 3, postero-external (disto-buccal) root or site of same.

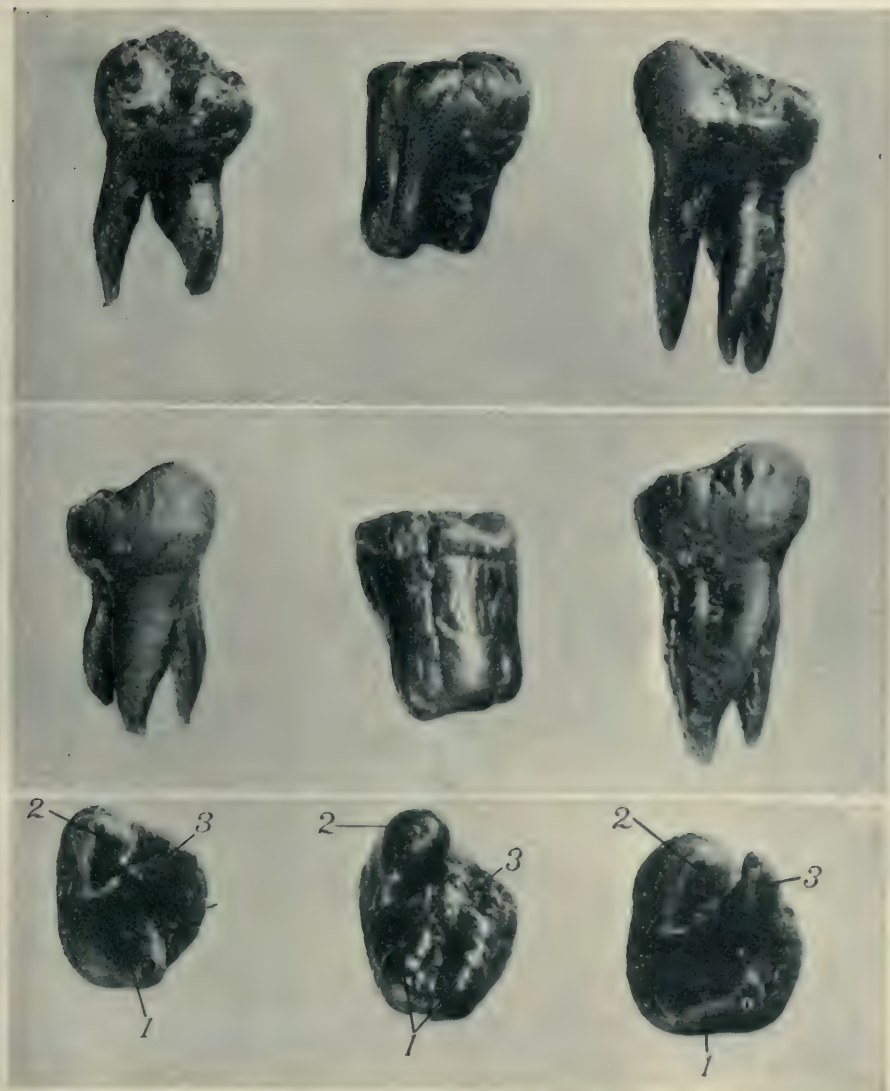


Fig. 2. Comparative figures of upper molars of *Hesperopithecus* and modern chimpanzee (continued), $\times 2$.

UPPER ROW: buccal aspect, m^3 chimpanzee, m^2 (?) *Hesperopithecus*, m^3 chimpanzee.

MIDDLE ROW: lingual aspect, same series.

LOWER ROW: view from above, showing roots.



Fig. 3. Comparative figures of upper molars of *Pithecanthropus*, *Hesperopithecus* and modern American Indian, $\times 2$.

Upper row: occlusal aspect, second upper molar (cast) referred to *Pithecanthropus*, type upper molar of *Hesperopithecus*, and second upper molar of modern American Indian (ground down to near base of crown).

Middle row: anterior or mesial view of same series.

Lower row: posterior or distal view of *Pithecanthropus*, *Hesperopithecus*, and m¹ American Indian.



Fig. 4. Comparative figures of upper molars of *Pithecanthropus*, *Hesperopithecus* and modern American Indian (continued).

UPPER row: view from above, showing roots; second upper molar (cast) referred to *Pithecanthropus*, type upper molar of *Hesperopithecus*, first upper molar of American Indian (postero-external root broken off).

MIDDLE row: lingual aspect of same specimens.

LOWER row: occlusal aspect of molars of American Indians. Second upper molar ground down to near base of crown, second upper molar of opposite side natural wear, first upper molar much worn.

TABLE I.—COMPARATIVE MEASUREMENTS¹ AND INDICES OF *HESPEROPITHECUS* TYPE UPPER MOLAR

	<i>Hesperopithecus</i> Type m ² ?	Chimpanzee A. M. N. H. m ³ 51278	Chimpanzee A. N. I. H. m ³ 51278	<i>Pithecanthropus</i> Cast m ²	American Indian A. M. N. H. m ² 2161 Crown ground down	American Indian A. M. N. H. m ³ 2161 Natural wear	American Indian A. M. N. H. m ³ 22166 Natural wear
a.—Antero-post. diam. middle of crown at base	10	10	11.5	12	10	10.2	10
b.—Distance inner base protocone to outer base paracone	12	12	13	13.4	12.2	12.5	12.3
Index 1: Relative transv. width ant. moiety of crown [$b \times 100 \div a$]	120	120	113	112	122	123	123
c.—Distance inner base hypocone to outer base metacone	10.2	9	10.7	11.5	11.5	11.8	12
Index 2: Relative transv. width post. moiety of crown [$c \times 100 \div a$]	102	90	93	96	115	116	120
d.—Distance ant. base paracone to post. base metacone	10.5	10.2	11.8	12.2	10.8	10.8	11.2
Index 3: Relative ant. post. diam. outer margin of crown [$d \times 100 \div a$]	105	102	103	102	108	106	112
e.—Distance ant. base protocone to post. base hypocone	9.3	9.2	10.5	11.7	9.5	10	9.8
Index 4: Relative ant. post. diam. inner part of crown [$e \times 100 \div a$]	93	92	91	97	95	100	98
f.—Angle of outer border of crown to ant. border	62°	68°	60°	60°	70°	70°	70°
g.—Ant. post. diam. lingual root	6.8	5	6.2	7.7	5.7	5.7	6.5
Index 5: Relative ant. post. diam. of lingual root [$g \times 100 \div a$]	68	50	54	64	57	56	65
h.—Angle of axis of lingual root to that of antero-buccal root	21 5°	25°	22 5°	m ² 27° m ³ 35°	5°	5°	18°

¹Measurements are in millimeters.

TABLE II.—VARIABILITY OF ANGLE OF AXIS OF LINGUAL ROOT TO THAT OF ANTERO-BUCCAL ROOT IN HUMAN MOLARS

	Am. Ind.		Bedouin		White Man	Am. Ind.	
	A. M. N. H. 2161	A. M. N. H. 22166	A. M. N. H. 7224	A. M. N. H.		A. M. N. H. 22165	A. M. N. H.
m ²	5°	13°	14°				
m ¹		18°	18°	28°		43°	

REMARKS ON THE MEASUREMENTS AND INDICES

(Cf. Tables I, II and Figures 1-4)

The type upper molar of *Hesperopithecus* approaches the third upper molar of a certain chimpanzee in the general dimensions of the base of the crown, that is in four measurements, *a*, *b*, *d*, and *e*, and in two indices, 1, 4. This is the greatest number (six) of agreements recorded in the table. It differs from the same in the much greater relative width of the posterior moiety of the crown (index 2), in the much greater relative antero-posterior diameter of the lingual root (index 5) and in the lesser divergence, or forking, of the lingual and antero-buccal roots (*h*).

It approaches the second upper molar of the same chimpanzee in the transverse diameter of the posterior moiety of the crown (*c*), in the angle of the outer surface of the crown to the anterior surface (*f*), and in the degree of divergence of the axis of the lingual root to that of the antero-buccal root (*h*). All these are important points in favor of the view that the type is an m² rather than an m³.

The type upper molar of *Hesperopithecus* differs from the m² (cast) of *Pithecanthropus* in nearly all the absolute measurements, but approaches it in the great size of the lingual root (index 5), in the angle of the outer side of the crown to the anterior side (*f*), and especially in the evenly concave form of the grinding surface.

While approaching the second upper molars of certain American Indians in four absolute measurements, *a*, *b*, *d*, and *e*, and in two indices, 1 and 3, the type upper molar of *Hesperopithecus* differs widely in the more asymmetrical form of crown with narrower posterior moiety (index 2),¹ in the greater size of the lingual root and especially in the greater

¹The apparent asymmetry and relative narrowness of the posterior moiety of the crown in the type may be due in a considerable degree to the advanced condition of wear in the region of the hypcone. A difference of this character may be noticed in the comparison of a less worn and a more worn second upper human molar of the same dentition (Figure 3).

divergence of the lingual and antero-buccal roots,¹ and in the smaller transverse diameter of the antero-buccal root.

The marked asymmetry and small transverse diameter of the posterior moiety are pronounced in the second upper molar of the "Moustertian youth" of the Neanderthal race, as well as in certain Australian skulls.

The type of *Hesperopithecus* approaches the first upper molar of a certain American Indian (Table I) in three important characters (*a*, *g*, and index 5).



Fig. 5. Comparative radiographs of upper molars of chimpanzee, *Hesperopithecus* and American Indians.

Upper row: vertical projection; chimpanzee *m*¹, chimpanzee *m*², *Hesperopithecus*, American Indian *m*¹, American Indian *m*¹.

Middle row: antero-posterior projection; chimpanzee *m*², *Hesperopithecus*, American Indian *m*², American Indian *m*¹.

Lower row: transverse projection; chimpanzee *m*², *Hesperopithecus*, American Indian *m*², American Indian *m*¹.

¹There is, however, a wide range of variability (from 5 to 43°) in this character in man (see Table II).

RADIOGRAPHIC EXAMINATION OF TYPE SPECIMEN

Dr. George Palmer Ratner, D.D.S., has kindly submitted the following report, New York, August 25, 1922.

Under radiographic examination the specimen submitted has the appearance of a molar tooth, i.e., crown portion and two roots: mesial-buccal and lingual; distal buccal apparently missing. Occlusal aspect discloses pulp floor having three openings for three independent roots.

There is present the pulp chamber in crown portion of tooth, also outline of one pulp in mesial-buccal root, terminating in two foramina. Large root, or lingual, discloses two independent pulps present in this root.

Remarks¹

Radiographic examination of the type molar tooth of *Hesperopithecus* reveals a triangular outline of the floor of the pulp chamber. At the angles of this triangle corresponding to the position of the roots there are three openings corresponding with the root canals. The floor of the pulp-cavity is well raised above the bifurcation of the roots, as in man (cf. Fig. 5). The floor of the pulp-cavity resembles that of anthropoids and man.

GEOLOGICAL OCCURRENCE OF THE *HESPEROPITHECUS* TOOTH

In response to our request Dr. W. D. Matthew has kindly supplied the following statement.

This specimen was found by Harold J. Cook in the upper level of the Snake Creek quarries at a point which has been named Oleott Hill, on the ranch of Mr. Harry Ashbrook, twenty miles south of Agate, Nebraska. The Upper Snake Creek at this point consists of sand, pebbles and numerous fragments of bone, forming irregular lenses, or pockets, on the eroded surface of an older formation, the Sheep Creek beds. They appear to be channel-fill lenses and extend for a distance of about three miles to the westward, cropping out at the heads of a series of little 'draws,' or dry gullies on the southwest margin of the sand-hill area between the Niobrara and North Platte valleys. Associated with the channel-beds are finer, uniform, clean sands, partly of eolian deposition, partly water-deposited, and varying in thickness from twenty feet to zero, covered by the sodded surface of the plains.

Fossils are abundant and varied in the channel-beds but mostly very fragmentary and usually rolled or waterworn to a varying degree. Generally they are mineralized to the extent of partly filling the minute canals and pores of the bones, but the larger hollows are either filled with loose sand or empty. The color is usually blue-black from iron phosphate. Sometimes the bones are mottled light yellow, or completely dead white, and the degree of mineralization varies to a considerable extent.

The finer sands contain the same or a slightly later faunal phase but fossils are rare in them, although apt to be well preserved when found.

¹By Milo Hellman.

The fauna found in these upper Snake Creek beds has been extensively collected and carefully studied by the writer, Harold Cook and others. It appears to be a unit fauna and of Lower Pliocene age, save for occasional specimens of the Upper Miocene Lower Snake Creek fauna, presumably due to re-deposit. Except for a single specimen, a Bison jaw found on the surface in 1908 (we have no exact record or recollection of the exact circumstances), no fossils have been found at this locality which would indicate an admixture of Upper Pliocene, Pleistocene or recent faunas. Thousands of equid teeth have been found, all of the older Pliocene (or Upper Miocene) species, not one that would suggest Pleistocene age. In view of the great number of fossils it is safe to say that no Pleistocene admixture is present.

As regards the *Hesperopithecus* tooth, it was found by Mr. Cook in place in the Upper Snake Creek channel-beds, and as the finder is an experienced geologist and palæontologist, thoroughly familiar with this fossil locality and the fauna, his reports and conclusions are considered exceptionally valid proof of its occurrence. The preservation of the tooth is entirely normal and similar to the rest of the Upper Snake Creek fauna.

The following list of the associated fauna is not complete, but suffices to show its relations:

Carnivora.—Ursidæ—*Hyænarcos* sp.

Mustelidæ—*Brachypsalis* sp.

Canidæ—*Aelurodon haydeni* var.

“ *ævus* var.

Felidæ—*Machærodus* sp.

Perissodactyla.—Equidæ—*Pliohippus leidyani*

“ cf. *mirabilis*

Protohippus cf. *perditus*

“ *placidus* var.

Hipparion affinis

“ *gratum* var.

Rhinocerotidæ—*Peraceras* sp.

Aphelops sp. *indesc.*

Teleoceras cf. *fossiger*

Artiodactyla.—Dicotylidæ—*Prosthennops* cf. *serus*

Camelidæ—*Alticamelus* cf. *procerus*

Pliauchenia gigas

?*Procamelus* sp.

Cervidæ—? *Cervavus* sp.

Antilocapridæ—? *Merycodus* sp.

Bovidæ—*Neotragoceras improvisus*

Edentata.—Megalonychidæ—*Megalonyx* cf. *leptostomus*

Glires.—Sciuridæ—*Sciurus* cf. *aberti*

Mylagaulidæ—*Mylagaulus* sp.

Geomyidæ—*Thomomys* sp.

Proboscidea.—Mastodontidæ—*Miomastodon matthewi*

Trilophodontidæ—? *Trilophodon* sp.

Insectivora.—Talpidæ—*Scalops* sp.

The above fauna is comparable with that of the Republican River of Kansas, Nebraska and Colorado, with the Rattlesnake of the John Day basin in Oregon, the

Thousand Creek beds of Nevada and various early Pliocene formations in the western United States. These are regarded by Osborn, Merriam and the writer as a practical equivalent in a broad way of the *Hipparion* fauna of Europe and Asia, which is assigned by most authorities to the Lower Pliocene.

The above data are considered by the writer to furnish fairly conclusive proof of the Lower Pliocene age of the *Hesperopithecus* tooth. There is no reasonable doubt as to its age.

CONCLUSIONS

1.—The differences from the third lower molar of *Hyænarctos*, with which Dr. Smith Woodward¹ suggested that the type upper molar of *Hesperopithecus* should be compared, are so fundamental that it is difficult to find any significant points of agreement. The third lower molar of *Hyænarctos* and of the modern bears has been derived by degeneration of a normal tuberculo-sectorial molar, as may be seen readily by comparison with various amphiyonines and other canids, while the molar of *Hesperopithecus* very clearly conforms to the modified tri- to quadritubercular type that is characteristic of the upper molars of anthropoid apes and man. The illustrations in the plates surely establish this beyond reasonable dispute.

2.—The posterior upper molar of the procyonid carnivore *Cercoleptes* (*Potos*) shows a distant resemblance to the type of *Hesperopithecus* which does not stand close comparison.

3.—There is a certain superficial resemblance of the worn third upper molar crown of *Lagothrix*, a South American monkey, to the type of *Hesperopithecus*. But in the former the lingual root in old specimens is directed strongly upward and backward, while in the latter it is directed upward and forward, with reference to the general plane of the masticating surface. Moreover, the great differences in size and in the detailed characters of the teeth do not favor the possibility of a near relationship of the two genera.²

4.—Of the higher primates, the Old World monkeys are excluded from close relationship to *Hesperopithecus* by the oblong contour of the upper molar crown; the gibbons come nearer but have much smaller molars, which are more elongate antero-posteriorly; in the gorilla, the antero-posterior elongation attains an extreme, and this ape also surpasses *Hesperopithecus* in the antero-posterior width of the lingual root and in the degree of its divergence from the outer roots; the orang has

¹Woodward, A. Smith, F. R. S., 1922, 'A Supposed Ancestral Man in North America.' *Nature*, CIX, No. 2745, p. 151.

²Comparisons with all other known genera of South American monkeys show marked differences from the type of *Hesperopithecus* either in crown or roots.

quadrate molar crowns with extremely wide lingual roots¹; the chimpanzees, while varying considerably in molar characters, appear to come nearest to *Hesperopithecus*, but the specimens here figured differ from it in the weakness of the roots, in the lingual reflection of the enamel upon the neck, and in the greater relative antero-posterior diameter of the crown (assuming that the type of *Hesperopithecus* is either an m^2 or an m^1).²

5.—Our results thus afford additional evidence in favor of Professor Osborn's conclusion³ that the type of *Hesperopithecus haroldcookii* represents an hitherto unknown form of the higher primates. It combines characters seen in the molars of the chimpanzee, of *Pithecanthropus*, and of man, but, in view of the extremely worn and eroded state of the crown, it is hardly safe to affirm more than that *Hesperopithecus* was structurally related to all three.

6.—Whether *Hesperopithecus* itself is or is not ancestral to man can only be determined by subsequent discovery, but meanwhile the only part definitely known of it, namely, the much worn type upper molar, represents a stage of evolution which comparative morphological evidence indicates as preceding the following definitely human specializations: (a) the reduction of the lingual root; (b) the lessening of the divergence of the lingual and buccal roots; (c) the widening of the antero-external root; (d) the antero-posterior shortening and transverse widening of the crown; (e) the tendency toward rectifying the asymmetry due to the narrowness of the posterior moiety of the crown. The *Hesperopithecus* molar shows the opposites of all these characters and such an assemblage of primitive features has not hitherto, so far as we are aware, been found in any single human molar.

7.—The anatomical, palæontological, and other evidence⁴ already accumulated tends to show that man, *Pithecanthropus*, *Hesperopithecus*, and the various anthropoids form a natural superfamily group, which may now be named the **Hominoidea**, in contrast with the **Cercopithecoidea**, or Old World monkeys.

8.—The palæontological, anatomical, and taxonomic evidence considered together indicates that the stem forms of this group arose in the early Tertiary times from primates that were closely allied to or identical with the Lower Oligocene *Parapithecus*, which in turn, so far as

¹That is in m^1 m^2 ; m^2 varies greatly.

²Dr. Miller notes that in other specimens of chimpanzees the weakness of the roots seems to hold as a constant character; but that the reflection of the enamel upon the neck may be reduced by wear.

³*Op. cit.*

⁴See W. K. Gregory, 1921, 'The Origin and Evolution of the Human Dentition.'

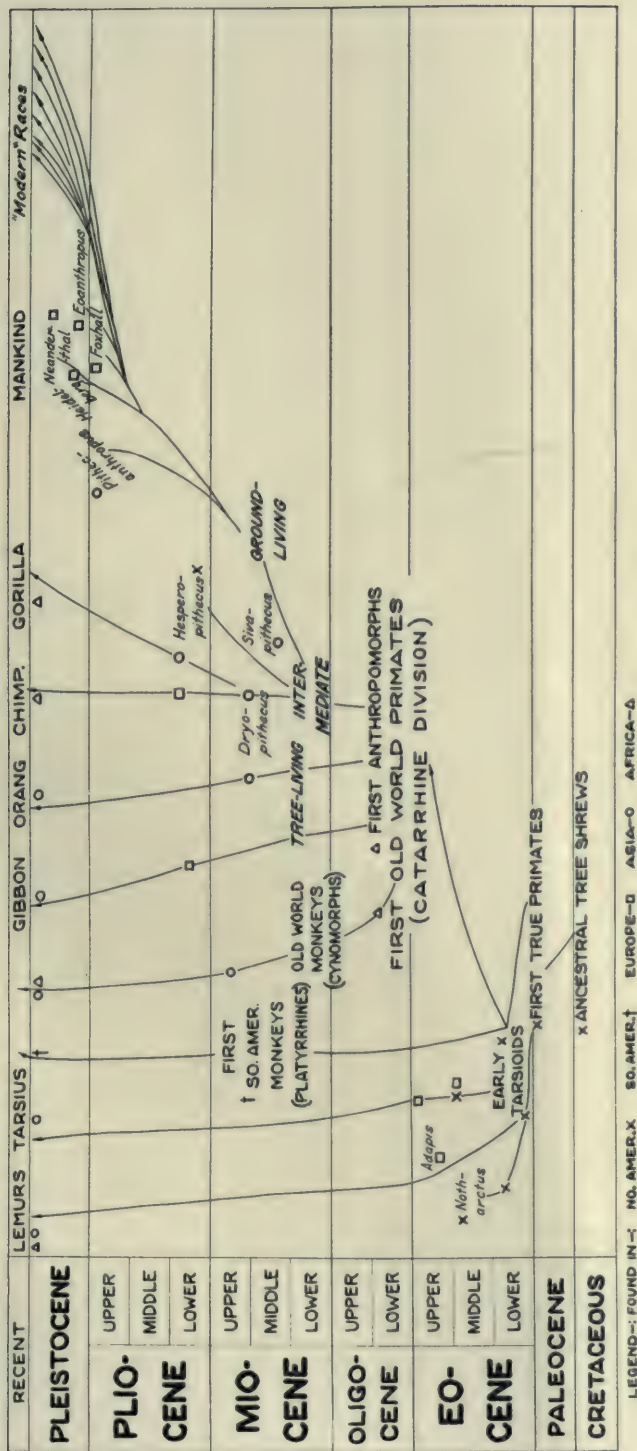


Fig. 6. Geological succession and relationships of the principal types of Primates, according to present evidence from palaeontology, comparative anatomy, anthropology, etc. W. K. Gregory, 1922.

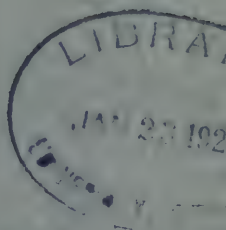
known, shows a remarkable mingling of characters tending to connect the whole Old World series of primates with the stem of the Eocene tarsoids (Schlosser, Gregory).

9.—There was a wide adaptive radiation of this group in the Middle Tertiary, very diverse species having been found fossil in western and eastern Europe and India. *Hesperopithecus* was one of the Lower Pliocene survivors of this group, which had apparently spread northeastward along the route followed by various mastodons, antelopes, and other mammals described by Professor Osborn.¹

¹Osborn, Henry Fairfield, 1922, '*Hesperopithecus*, the Anthropoid Primate of Western Nebraska,' *Nature*, Aug. 26, 1922, p. 281. For a fuller discussion of the paleontological evidence for the faunal connection of western North America with northeastern Asia in late Tertiary times, see Matthew, W. D., 1915, 'Climate and Evolution,' *Ann. N. Y. Acad. Sci.*, XXIV, pp. 234-255; also Matthew and Cook, 1909, 'A Pliocene Fauna from Western Nebraska,' *Bull. Amer. Mus. Nat. Hist.*, XXXVII, pp. 307-309, 413.

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MAMMALS FROM MEXICO AND SOUTH AMERICA

By H. E. ANTHONY



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MAMMALS FROM MEXICO AND SOUTH AMERICA

By H. E. ANTHONY

Mr. W. W. Brown has been collecting birds for Dr. L. C. Sanford in the Province of Tamalipas, Mexico, and in a recent shipment were three small mammals which the American Museum acquired by purchase. Upon examination, one of these mammals, a bat related to *Plecotus* and to *Corynorhinus*, has proved to be of an undescribed genus. I am greatly indebted to Mr. Gerrit S. Miller, Jr., for comparing this specimen with the vespertilionid bats in the United States National Museum and also for the loan of specimens of *Plecotus*. Mr. Miller was unable to match this bat with any genus in the collections under his charge and has confirmed my opinion of its distinctness.

IDIONYCTERIS, new genus (Vespertilionidæ)

GENOTYPE.—*Idionycteris mexicanus*, new species.

GENERAL CHARACTERS.—Allied to *Plecotus*, which it resembles in appearance, but being unique among known bats by the possession of two distinct lappets or membranous leaves, which arise near the midline of the band connecting ears across forehead and appear like a pair of misplaced tragi.

DESCRIPTION.—Size about as in *Plecotus*; ears very large and broad, joined across forehead; tragus tall and lanceolate; nostrils simple; glandular outgrowths on nose, if present, very inconspicuous (in dried specimen the nose appears to be without outgrowths); a pair of peculiar membranous processes, arising from the band which connects ears, standing free of the true ear and of each other; a small patch of whitish hair at posterior base of ear; pelage long, lax, silky; skull rather broad; dentition as in *Plecotus*.

Idionycteris mexicanus, new species

TYPE.—No. 62260, Amer. Mus. Nat. Hist., ♀ ad.; Miquihauna, Province of Tamalipas, Mexico; June 17, 1922; collector, W. W. Brown. The type is a skin and skull, both in good condition.

GENERAL CHARACTERS.—In general appearance a typical, big-eared vespertilionid, about the size of *Plecotus*, but readily distinguished by the paired membranous processes arising from the low aural connecting band. (See Figs. 1 and 2.)

DESCRIPTION.—

Ears large and broad, similar in outline to those of *Plecotus* and *Corynorhinus*, outer margin slightly convex, inner margin strongly convex, tips rounded; ears connected across forehead by a low band, from which arises a pair of processes, similar in shape to low, blunt tragi, entirely free from the ear couch and from each

other; tragus tall, slender, simple, with external basal notch; nostrils simple and no glandular masses on muzzle that are apparent on the dried skin; wing membrane normal; interfemoral membrane wide; pelage long, lax and silky.

Color, above, Naples yellow (Ridgway) on tips of hairs which are blackish brown basally; short hair on posterior base of ear conch soiled whitish; hair of upperparts not extending on to wing membranes; only a few scattered hairs on the basal surface of the interfemoral membrane; color, below, almost identical with that above but the hair is shorter and the general appearance is somewhat lighter.

Skull rather broader and more heavily built than that of *Plecotus*, braincase more depressed; general appearance typically vespertilionid.



Fig. 1. Head of *Idionycteris mexicanus*, type, about twice natural size.

Dental formula, incisors two above, inner with small basal notch, outer simple, three below, their cutting edges trifid; canines, above and below, of normal height, simple; on lower canine the cingulum rises anteriorly to form decided notch; premolars, above, two, the first minute, crowded between canine and second premolar but within line of toothrow, second premolar with main cusp slightly higher than cusps of molar series, bulk of second premolar about half of first molar; premolars, below, three, second smaller than first, first smaller than third; molars, above, three, the first two subequal, with typical W pattern, third about half as large; molars, below, three, subequal in size, normal in pattern.

MEASUREMENTS. — Taken in the flesh: total length, 110 mm.; tail vertebrae, 50; hind foot, 10; wing expanse, 285; taken from the dried skin: height of ear, from notch, 34; height of tragus, from same point, 12; height of processes, above forehead, 3.5. Greatest length of skull, 17.2; greatest breadth of skull, 9.8; interorbital breadth, 4.4; upper toothrow, incisor to last molar, 6.3.

There appears to be little doubt that the closest relationships of *Idionycteris* are with *Plecotus*. While the general structures of the skulls of the two genera are along slightly different lines, the dentition shows close accord, even to the pattern of the incisors. The inner upper incisor of *Idionycteris* has the accessory cusp low down on the base of the tooth; in *Plecotus* this tooth appears almost to have a bifid cutting edge, the two cusps being subequal in height.

In the character of the accessory processes from the membrane connecting the ears, *Idionycteris*, however, stands unique. These processes are truly a part of the general ear structure but are completely free of the



Fig. 2. Head of *Plecotus auritus*, about twice natural size.

conch itself and are not a fold of the connecting membrane. As shown in the figure, they stand erect from the forehead, joined at the base to the connecting band, part of which passes behind them as a low continuous ridge across the head. The internal notch on the ear of *Plecotus* does not appear in any way to be homologous with the processes seen in *Idionycteris*; but it would be a structural possibility for the notch in the ear of *Plecotus* to migrate downward and produce a condition similar to that of the *Idionycteris* ear, so it is not advisable to be too positive on this point.

Compared with *Corynorhinus*, the new genus does not have as many characters in common as it has with *Plecotus*, although the relationship is close. The fact that *Idionycteris* has been compared with *Plecotus*,

an Old World genus, rather than with the New World vespertilionids, is a recognition of the antiquity of the group and the great geographical ranges of its members.

COLOMBIAN MAMMALS

The American Museum, through the kindness of Brothers Apolinar Maria and Nicéfero Maria, of the Instituto de la Salle of Bogotá, Colombia, has received from time to time small collections of mammals made in the vicinity of Bogotá and of Medellín. Some of these mammals have proved to be species new to science and have been described by the late Dr. J. A. Allen. Others are rare and little-known forms which have been no less desirable additions to the Museum's collections. The following list of species is to serve as a catalogue of the mammals received from these enthusiastic naturalists of Colombia and not hitherto published upon.¹

***Didelphis paraguayensis meridensis* Allen**

1902. *Didelphis paraguayensis meridensis* ALLEN, Bull. Amer. Mus. Nat. Hist., XVI, p. 274.

Choachi, 1; Bogotá, 1, juvenile.

These specimens appear to agree well with the series from Mérida, the type locality.

***Didelphis marsupialis caucæ* (Allen)**

1900. *Didelphis karkinophaga caucæ* ALLEN, Bull. Amer. Mus. Nat. Hist., XIII, p. 192.

El Poblado, near Medellín, 1.

On geographical grounds, this specimen should be referred to *caucæ* and the agreement with the type specimen, from Cali, Upper Cauca Valley, is quite close.

***Philander laniger cicur* (Bangs)**

1898. *Philander cicur* BANGS, Proc. Biol. Soc. Wash., XII, p. 161.

1913. [*Philander*] [*laniger*] *cicur* THOMAS, Ann. and Mag. Nat. Hist., (8) XII, p. 358.

Fusugasuga, 1; Cordillera del Rusio, 1; Viotá, 1; without locality, 1.

Mr. Oldfield Thomas, in his discussion of the races of *laniger*, *loc. cit.*, gives *cicur* as the form ranging through Santa Marta, Bogotá, and Mérida. Owing to the lack of comparative material, and because the

¹For a list of the mammals of Colombia, collected for the American Museum, 1910-1915, which includes the earlier mammals sent in by Brothers Apolinar Maria and Nicéfero Maria, see Bull. Amer. Mus. Nat. Hist., XXXV, Art. 18, pp. 191-238, by J. A. Allen.

specimens under consideration are badly faded, they are assigned to *cicur* on the grounds of geographical distribution.

Marmosa species?

Jerico, Antioquia, 1.

A specimen of *Marmosa*, probably immature, with fragmentary skull, cannot be satisfactorily identified at this time. It is one of the smaller species, grayish in color, and may be either *phæa* or possibly *caucæ*.

Bassaricyon medius Thomas

1909. *Bassaricyon medius* THOMAS, Ann. and Mag. Nat. Hist., (8) XXI, p. 232.
Santa Elena, 1.

A skin, with skull, of this rare species, taken at Santa Elena, agrees well with the type description.

Sciurus (Leptosciurus) pucheranii medellinensis (Gray)

1872. *Macroxus medellinensis* GRAY, Ann. and Mag. Nat. Hist., (4) X, p. 408.

1915. *Leptosciurus pucheranii medellinensis* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXIV, p. 202.

La Ceja, 1; La Laguna, 2; Santa Elena, 5.

This series varies somewhat in coloration but not to any great extent.

Mus musculus musculus Linnaeus

1758. *Mus musculus* LINNÆUS, 'Syst. Nat.,' I, p. 62.

Paramo de Choachi, 1; El Granizal, near Medellin, 1.

Oryzomys pectoralis Allen

1912. *Oryzomys pectoralis* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXI, p. 83.

La Ceja, 1.

This specimen agrees quite well with the large series of *pectoralis* from Colombia in this museum. The range of the species of *Oryzomys* allied to *albicularis* of Tomes has not been very well worked out; and, while there have been a number of species described which all bear considerable resemblance not only to *albicularis* but to each other, so that some should doubtless be dealt with as synonyms, on the other hand, the factors of geographical separation and local environment must be taken into consideration. It is difficult to believe that a species of a genus as plastic as *Oryzomys* appears to be can range over the Andean system without becoming differentiated in some way. More material is needed to establish the standing of this group of species which are too

closely related to one another to be all accorded full specific rank. Dr. Osgood in 1914, in his 'Mammals of an Expedition Across Northern Peru,' Field Mus. of Nat. Hist., X, No. 12, p. 159, points out this similarity and would synonymize *O. childi*, *O. o'connelli*, and *O. pectoralis* with *O. meridensis*, a treatment which has much to commend it, but which in some respects may fail to allow for wide geographical separation.

***Oryzomys (Oligoryzomys) dryas humilior* Thomas**

1898. *Oryzomys dryas humilior* THOMAS, Ann. and Mag. Nat. Hist., (7) II, p. 268.

Choachi, Bogotá region, 4.

The type locality of *humilior* is given as "Plains of Bogotá," hence this series may be assumed as being practically topotypical. Two specimens are in good condition, although the skulls are badly broken, while the other two are not of much value for comparison. The former agree well with the type description, the black ears being especially diagnostic.

***Oryzomys* species?**

La Ceja, 1.

This specimen is a native-made skin with a badly fractured skull, and I am unable to match it satisfactorily with any *Oryzomys* in the collection of the American Museum or any that I have seen described. The skull is typically oryzomine while the animal is of medium, robust build, hind foot about 24 mm. in length. In color and texture of fur it closely resembles *Thomasomys cinereus*.

***Oryzomys* species?**

Susumuco, 2; Rio Guatemala, 1.

These three specimens belong to the short, velvety-furred section of the genus. They resemble *palmiræ* Allen somewhat in appearance but seem to be too large for that species. Geographically, the region where they were taken is rather distant from the type localities of all of the other velvet-furred *Oryzomys*, some of which are known to me only from descriptions, and I am reluctant to assign a definite specific name upon the basis of the available material.

***Melanomys buenavistæ* Allen**

1913. *Melanomys buenavistæ* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXII, p. 547.

Susumuco, near Villavicencio, 1.

This specimen lacks a skull but there is little hesitation in referring it, on the basis of close agreement in external characters, to *buenavistæ*, the type locality of which is very near to Susumuco.

Thomasomys laniger (Thomas)

1895. *Oryzomys laniger* THOMAS, Ann. and Mag. Nat. Hist., (6) XVI, p. 59.

1917. *Thomasomys laniger* THOMAS, Ann. and Mag. Nat. Hist., (8) XX, p. 196.

Paramo de Choachi, 3.

These specimens agree fairly well with the type description and, since the type of *laniger* came from the Bogotá region, they may be assumed to be topotypical.

Thomasomys cinereiventer Allen

1912. *Thomasomys cinereiventer* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXI, p. 80.

Le Ceja, 1.

This specimen appears to have a noticeably smaller foot than that of typical *cinereiventer* and more material may disclose the presence of an undescribed form about the Medellín region. In coloration and general appearance, the specimen matches very well the large series of *cinereiventer* from Colombia, now in this museum.

Rhipidomys species?

Susumuco, Bogotá region, a skin without skull.

This specimen has the appearance of typical *Rhipidomys*, with short feet darkened along the metapodials, hind foot about 30 millimeters in the dried skin. The tail is about 170 mm., approximately the length of head and body. The fur of upperparts is mixed clay-color and black, of underparts cream-color.

Lacking specimens of *Rhipidomys* from the eastern slopes of the eastern Andes for comparison, it is impossible to identify this skin at the present time.

Akodon chapmani Allen

1913. *Akodon chapmani* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXII, p. 600.
Choachi, 1.

Microxus bogotensis (Thomas)

1895. *Acodon bogotensis* THOMAS, Ann. and Mag. Nat. Hist., (6) XVI, p. 369.

Paramo de Choachi, 1.

This specimen appears to agree well with the type description given by Thomas.

***Proechimys o'connelli* Allen**

1913. *Proechimys o'connelli* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXII, p. 479.

Villavicencio, 2.

These specimens are topotypical since the type, collected by G. M. O'Connell, was taken at Villavicencio. Only one of the specimens is adult and it is somewhat darker along the back than the type.

***Anoura geoffroyi apolinari* (Allen)**

1916. *Glossophaga apolinari* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXV, p. 86.

1921. *Anoura geoffroyi apolinari* ANTHONY, Amer. Mus. Novitates, No. 20, p. 6.

Bogotá region, a skin, without skull.

This specimen is practically topotypical since the type locality is Boqueron de San Francisco, near Bogotá.

***Vampyrops*?**

Choachi, near Bogotá, one skin without skull.

This specimen presents, in general, the characters of *Vampyrops*, but lacks any light-colored striping on back or face. It is a native-made skin and without a skull it is difficult to make more than provisional identification. It is unlike any species of *Vampyrops* in the collection of the American Museum and possibly represents an undescribed form. In size it approximates *Vampyrops lineatus* and has densely haired hind legs and feet.

***Hemiderma perspicillatum* (Linnaeus)**

1758. *Vespertilio perspicillatus* LINNÆUS, 'Syst. Nat.', 10th Ed., p. 31.

1907. *Hemiderma perspicillatum* HAHN, Proc. U. S. Nat. Mus., XXXII, p. 108.

Rio Guatemala, 1.

This specimen is quite noticeably reddish brown, brighter than any of the series of *perspicillatum* from Colombia, in this Museum. The forearms are broken, so that measurements cannot be taken, and it appears best to include it under the name that has always been used hitherto for Colombia *Hemiderma*.

***Glossophaga soricina soricina* (Pallas)**

1766. *Vespertilio soricinus* PALLAS, Miscell. Zool., p. 48.

Paramo de Choachi, 1.

Desmodus rotundus (Geoffroy)1810. *Phyllostoma rotundum* GEOFFROY, Ann. Mus., XV, p. 181.1826. *Desmodus rufus* WIED, Beitr. Naturg. Brasil, p. 233.

La Ceja, near Medellin, 1.

This specimen presents no characters calling for special comment.

Lasiurus varius (Poeppig)1835. *Nycticeius varius* POEPPIG, 'Reise in Chile,' I, p. 451.

Near Bogotá, 1.

This specimen is called *varius* more because of the convenience of following such a blanket name than because of a fixed belief that the Colombian specimen actually is identical with Poeppig's species. Owing to lack of comparative material and the apparent confusion of earlier writers in dealing with the reddish South American *Lasiuri*, it is impossible to do more than adopt some such temporary expedient.

Myotis caucensis Allen1914. *Myotis caucensis* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXIII, p. 386.

Bogotá region, 1.

This specimen agrees fairly well with the type, which came from the valley of the Rio Cauca.

Molossus bondæ Allen1904. *Molossus bondæ* ALLEN, Bull. Amer. Mus. Nat. Hist., XX, p. 228.

Bogotá region, 1.

The type of *bondæ* is reddish brown but topotypes are darker indicating that the species is dichromatic. The Bogotá specimen is between warm sepia and bister in coloration.

Aotus lemurinus (I. Geoffroy)1844. *Nyctipithecus lemurinus* I. GEOFFROY, Arch. du Mus. d'Hist. Nat. de Paris, IX, p. 24, Pl. II.1916. *Aotus lemurinus* ALLEN, Bull. Amer. Mus. Nat. Hist., XXXV, p. 234.

Muzo, northwest of Bogotá, 1.

The Muzo specimen has no black on hands or feet, which are rather grayish in color, nor has it any black areas on the tail. The pelage is decidedly worn however and, taking into consideration the amount of individual variation in the genus and the fact that the type series of *lemurinus* came from near Bogotá, the specimen is given the older name of Geoffroy's rather than to follow the ruling of Dr. Elliot, *loc. cit.*, who synonymized *lemurinus* with *vociferans*.

Cebus fatuellus (Linnæus)

1766. *Simia fatuellus* LINNÆUS, 'Syst. Nat.,' I, p. 42.

1913. *Cebus fatuellus* ELLIOT, 'Review of Primates,' II, p. 102.

Villavicencio, 1.

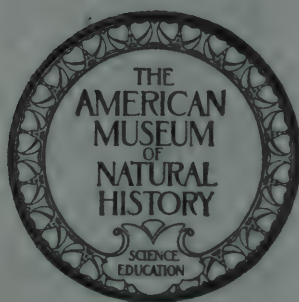
This specimen agrees well with the description of *fatuellus* as set forth by Elliot, *loc. cit.*, but the range as given by the same author falls rather too far to the west to include Villavicencio, which is on Amazonian drainage.

AMERICAN MUSEUM NOVITATES

No. 55

PRELIMINARY REPORT ON ECUADOREAN MAMMALS No. 3

By H. E. ANTHONY



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PRELIMINARY REPORT ON ECUADOREAN MAMMALS. NO. 3

By H. E. ANTHONY

This is the third paper of a series based upon mammals collected in Ecuador.¹ The field work in Ecuador which has produced the collections that serve as the basis of these preliminary reports was begun in 1920 and has been carried on during part of 1921 and 1922. An expedition is at present in Ecuador visiting regions hitherto unrepresented in the Museum collections. Eventually it is expected that sufficient material will be brought together to justify an extended report on the mammals of this republic. The following new forms have been disclosed by studies of the specimens already at hand.

In making the necessary comparisons with the Ecuadorean series, I have been greatly assisted by the loan of material from the United States National Museum, the Field Museum of Natural History, and the Academy of Natural Sciences of Philadelphia.

Cænolestes tatei, new species

TYPE.—No. 61860, Amer. Mus. Nat. Hist.; ♀ ad.; Molleturo, Provincia del Azuay, 7600 feet, Western Andes; June 11, 1922; collector, G. H. H. Tate. The type is a skin and skull with trunk skeleton, in fair condition, the skin having slipped to some extent on the abdomen.

GENERAL CHARACTERS.—Similar to *fuliginosus*, and smaller than *caniventer*; darker in color than either.

DESCRIPTION.—

Color above, everywhere practically unicolor, the soft fur plumbeous black for most of its length and only the extreme tip touched with color, which is near bone-brown (Ridgway); hands paler than color of upperparts; feet dark like back; tail above and below very much like back; ears practically naked, bone-brown.

Color below, lighter than above, hairs tipped with benzo brown; color transition from upper to lower parts very gradual.

Skull essentially as in *fuliginosus*; canine single-rooted; second incisor with shallow posterior notch; third incisor with cutting edge practically continuous; first and second premolars subequal.

MEASUREMENTS.—Taken in the flesh: total length, 213 mm.; tail vertebræ, 117; hind foot, 22. Skull, greatest length, 28.8 (29.7,² 31.4³); length of nasals, 13.8 (12.7,

¹For first and second papers, see 'Preliminary Report on Ecuadorean Mammals. No. 1,' American Museum Novitates, No. 20, November 3, 1921, and 'Preliminary Report on Ecuadorean Mammals. No. 2,' American Museum Novitates, No. 32, March 4, 1922.

²Measurement of skull of *Cænolestes fuliginosus*, ♀, No. 12742, Acad. Nat. Sci. Philadelphia, Mt. Pichincha, Ecuador.

³Measurements of skull of *Cænolestes caniventer*, ♀, No. 47176, Cordillera de Chilla, Ecuador.

15); zygomatic breadth, 13.2 (13.9, 14.2); interorbital breadth, 7.2 (7.5, 7.8); length entire upper toothrow, 15.1 (16, 17.3); length of upper molar series from pm^2 to M^4 , 6.6 (6.7, 7.3); greatest breadth of palate, across outside margins of molar series, 7.3 (7.6, 7.7.).

Cænolestes tatei is easily distinguishable from either *fuliginosus* or *caniventer* by its darker coloration. In this respect it comes closest to *fuliginosus*, and another point of resemblance is shown by the soft, lax character of the fur in both of these forms, while the fur of *caniventer* is noticeably harsher. The differentiation of color between upper and lower parts of *tatei* is but slight, a greater degree being shown by *fuliginosus* but the greatest, amounting to a conspicuous difference, being evident in *caniventer*.

There are apparently no marked skull differences to distinguish *tatei* from *fuliginosus*. The character of the notched second incisor deserves special comment, as this feature is quite evident in *tatei*. That the condition of the cutting edges of the broad second and third upper incisors may prove to be a character of considerable diagnostic value is strongly hinted by the series of skulls of *Cænolestes* now before me. A series of eight skulls of *caniventer* show second and third incisors very distinctly notched, while skulls of *fuliginosus* and *obscurus* have only the second incisors notched in *fuliginosus* and no incisors notched in *obscurus*. *C. tatei* presents a condition more or less intermediate between the two extremes represented by *caniventer* and *obscurus*. Dr. W. H. Osgood, in his important monograph of *Cænolestes*, makes no mention of notches in the cutting edge of the second and third upper incisors, so it is presumed that his series of *obscurus* lacked this character.

The discovery of a new species of *Cænolestes* at a locality between the known ranges of *fuliginosus* and *caniventer* is most interesting and demonstrates the need of systematic collecting before it can be said that much is known of the genus. The altitude of Molleturo, 7600 feet, an elevation much below that of the Pichincha region, from whence most of the specimens of *fuliginosus* have come, probably explains the differentiation shown by the new species. Molleturo is on the western flank of the Western Andes, in a belt of heavy rainfall, a densely forested slope, and the environmental conditions are quite distinct from the high paramo uplands about Pichincha.

It is also of interest to note that a series of three *Cænolestes* were taken at Molleturo, two of them apparently *caniventer*, although rather dark in color and only one of the quite distinct *tatei* pattern.

I take pleasure in naming this new form in honor of Mr. G. H. H. Tate, who collected it. The activities of Mr. Tate as a mammal collec-

tor for the American Museum have resulted in the acquisition of some hundreds of specimens and the capture of this recent series of *Cænolestes* is one of the results of his energy.

***Thomasomys hudsoni*, new species**

Fig. 1, A and B, natural size

TYPE.—No. 47690, Amer. Mus. Nat. Hist.; ♂ ad.; Bestion, Provincia del Azuay, 10,100 feet, Ecuador; January 13, 1921; collector H. E. Anthony. The type is a skin and skull, both in good condition.

GENERAL CHARACTERS.—Similar to *gracilis* Thomas in general superficial characters but having a peculiarly shaped nasal region which differs from that of any hitherto described *Thomasomys*.

DESCRIPTION.—

Color above, between Dresden-brown and mummy-brown, darkest along dorsal area; fur long and soft; hands and feet hair-brown, the claws surrounded by short whitish hairs; tail long and slender, colored like feet, unicolor, sparsely clothed with fine hairs.

Color below, warm buff, no line of demarcation where color of upperparts merges into that of lower parts. Hairs above and below with plumbeous black bases.

Skull normal in all respects except through frontal and nasal region; frontals somewhat inflated, nasals slightly concave in dorsal outline and rounded to form a slender, subcylindrical tube; incisive foramina not quite extending to plane of first molar teeth; bullæ of medium size, inflated.

MEASUREMENTS—Taken in the flesh: total length, 213 mm.; tail vertebrae, 120; hind foot, 23. Skull, greatest length, 25.2 (24.5)¹; length of nasals, 8.7 (8.3); zygomatic breadth, 13.3 (13.1); breadth of braincase, 12.1 (12); interorbital breadth, 4.2 (3.7); length of incisive foramina, 4.4 (4.6); length of upper molar series, 3.5 (3.7).

The skin of *hudsoni* may be closely matched by a specimen of *gracilis*, No. 194786, U. S. N. M., Torontoy, Peru, the two being almost identical in color, above and below, although two other specimens of the Heller collection, from Lucma, are much brighter colored. The best basis of separation is the peculiar tube-like character of the nasals of *hudsoni* and their concave, "dished-in" appearance when viewed in profile. Each of the three skulls of *gracilis* now before me present flattened nasals, with a longitudinal depression extending along the basal three-quarters of their length, and show none of the lateral convexity so obvious in *hudsoni*. However, the closest relationships of *hudsoni* are evidently with *gracilis*, and the new form needs no detailed comparison with other species of *Thomasomys*.

Out of a series of eighteen *Thomasomys* collected at Bestion, only one proves to be *hudsoni*, all of the remainder being *bæops* (?). Bestion

¹Skull of *Thomasomys gracilis*, No. 194812, U. S. N. M.,* ♂, Lucma, Peru.

is in the south temperate zone but almost at the upper limit of forest. Most of the locality is comprised of rolling grassy meadows with scrub trees on some of the ridges and with thickets of brush on some of the slopes.

This species is named for Mr. W. C. Hudson, who at the time the expedition was at Bestion was camped along the Rio Shingata and in charge of exploration work for the South American Development Company. Mr. Hudson rendered great service to members of the party and will be long remembered as a most generous host.



Fig. 1. Skulls of *Thomasomys*

A, B. *Thomasomys hudsoni*, type.

C, D. *Thomasomys caudivarius*, topotype.

Thomasomys caudivarius, new species

Fig. 1, C and D, natural size

TYPE.—No. 47668, Amer. Mus. Nat. Hist.; ♂ ad.; Taraguacocha, Cordillera de Chilla, 10,750 feet, Provincia del Oro, Ecuador; August 23, 1920; collector H. E. Anthony. The type is a skin and skull, both in good condition.

GENERAL CHARACTERS.—A good sized species of the *cinereus* group, soft-haired, near mummy-brown of Ridgway above, tip of tail white.

DESCRIPTION.—

Color above, between mummy-brown and clove-brown, only the extreme tips of the hairs colored, the rest of the hair being plumbeous black to the base; somewhat lighter in color along the sides; hands and feet approaching color of upperparts but lighter; tail practically as dark below as above, mouse-gray proximally, hairs short but abundant, the annulations of the tail very conspicuous, terminal fifth of tail clear white; short tufts of glistening white hairs on bases of claws of feet.

Color below, everywhere near chamois, but with the dark bases of the hairs showing through to give much darker impression.

Skull similar to that of *cinereus*, nasals well expanded anteriorly, interorbital region rounded without beading of any sort; a small median depression just at nasal suture; braincase less inflated than in *cinereus*; incisive foramina and interpterygoid fossa scarcely extending to planes of anterior and posterior molars respectively; bullae small, elongate, showing very little inflation.

MEASUREMENTS.—Taken in the flesh: total length, 275 mm.; tail vertebrae, 161; hind foot, 30. Skull, greatest length, 31.9 (32.2)¹; length of nasals, 11.3 (12.7); zygomatic breadth, 16.9 (16); interorbital breadth, 5.2 (5.5); breadth of braincase, 14.2 (15.1); length incisive foramina, 6 (6.3); length of upper molar series, 5.1 (5.3); dimensions of auditory bulla, 5.4×4 (5.9×4.6).

T. caudivarius is separable on the basis of color alone from *cinereus*, *ischyrus*, *laniger*, *paramorum*, and *hylophilus*, the species of *Thomasomys* which by their pattern of coloration, character of fur, and size appear to be most nearly related to the new form. There are available for comparison fourteen specimens of *caudivarius*, all topotypes, of different ages, so that individual variation need not be an uncertain quantity. The series is quite uniform and none of them shows the brighter shades of brown seen in the species just listed. The character of the white-tipped tail appears to be of diagnostic value but is variable in its extent. The amount of white shown ranges from a conspicuous tip, almost one-quarter of the total length of the tail, to a white terminal pencil.

The cranial characters bear out the differences shown superficially, for *caudivarius* has very small bullae and they are elongate, with very little inflation.

Thomasomys hylophilus Osgood, from the Paramo de Tama, Venezuela and Colombia, is a close relative of *caudivarius* and, like it, has a white-tipped tail. Aside from the more pronounced olivaceous appearance of *caudivarius*, there is a noticeable difference in the hind feet of the two species. *T. caudivarius* has a longer and broader foot than *hylophilus*, but the identity in skull structure indicates that the two species are rather closely related. Geographically, they are separated by the breadth of the Andean system, since *hylophilus* is found on the eastern slopes of the Andes, *caudivarius* on the Western Andes.

T. cinereiventer is much larger than *caudivarius*, with much larger bullae, but externally the two species are much alike in coloration.

Most of the type series of *caudivarius* were taken along a small mountain brook which flowed down a steep narrow valley. The sides of the valley were densely covered with thick shrubbery and low stunted trees. Along the same stream, another species of *Thomasomys*, of smaller size, probably *T. bæops* Thomas, was common, the same trap perhaps taking the two species on alternate nights. *Thomasomys auricularis* (a new species described hereafter) was caught in this same locality, making three distinct species of the genus for that region. *T. caudivarius* was also taken out on the open paramo where there were no trees but an abundance of low shrubbery.

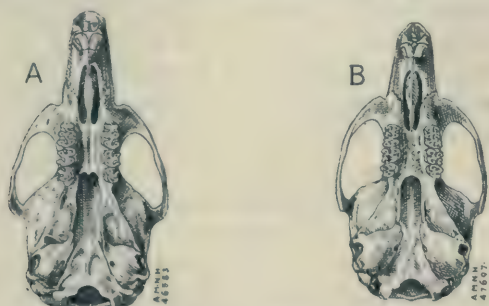
¹Skull of *Thomasomys cinereus*, No. 19807, Field Museum, ♂ ad., from Mts. E. of Balsas, Peru.

Thomasomys auricularis, new species

Fig. 2, B, natural size

TYPE.—No. 47697, Amer. Mus. Nat. Hist.; ♂ ad.; Taraguacocha, on trail from Zaruma to Zaraguro, altitude 10,250 feet, Cordillera de Chilla, Provincia del Oro, Ecuador; August 26, 1920; collector, H. E. Anthony. The type is a skin and skull, both in good condition.

GENERAL CHARACTERS.—A large species, almost equal in size to *aureus* which it resembles superficially, but with light-colored feet, an ochraceous auricular patch, and with auditory bullæ much larger than in *aureus* (see Fig. 2, A).

Fig. 2. Skulls of *Thomasomys*

- A. *Thomasomys aureus*, Pichincha, Ecuador
B. *Thomasomys auricularis*, type.

DESCRIPTION.—

Color above, tawny olive (Ridgway), closely sprinkled with blackish hairs, more especially along midline of back, flanks and sides more strongly tawny; head, lighter in tone than back, buffy brown; a small but conspicuous postauricular tuft of hair ochraceous buff in color; ears dark in color, scantily haired; hands and feet cream-buff above; tail unicolor, hair-brown.

Color below, pinkish buff, the color rather more intense over pectoral area; no line of demarcation in color between sides and underparts; hairs everywhere on body plumbeous black at base.

Skull large and strongly built but smaller than in *aureus*; nasals slender, expanded anteriorly; interorbital region rounded but with a long, shallow median depression; braincase not as inflated as in *aureus*; tooththrows normal; incisive foramina long and extending backward just beyond anterior margin of toothrow; interpterygoid fossa not reaching beyond posterior border of last molars; bullæ large and inflated, much larger than in *aureus* or *pratensis*.

MEASUREMENTS.—Taken in the flesh: total length, 345 mm.; tail vertebrae, 190; hind foot, 32. Skull, greatest length, 37.1 (38.8¹, 41.1²); length of nasals, 13.4 (14.1, 14.8); zygomatic breadth, 19.7 (20.4, 21.3); interorbital breadth, 4.4 (5.4, 4.4); length of upper molar series, 6.6 (7.7, 7.5); length of diastema, 8.8 (9.6, 10); length of incisive foramina, 7.7 (7.9, 8); dimensions of bulla, 7.3×6.1 (6.5×4.9, 6.7×5).

¹Skull of *Thomasomys aureus*, No. 46695, A. M. N. H., ♂, Pichincha, Ecuador.

²Skull of *Thomasomys aureus*, No. 194818, U. S. N. M., ♀, Torontoy, Peru.

Thomasomys auricularis is well characterized by its brightly colored postauricular patches and by the large, inflated auditory bullæ. With a very large series of *aureus* before me, most of them from Mt. Pichincha and the Quito region, but including also two specimens from Torontoy, Peru, kindly loaned me by the United States National Museum, I am unable to find any specimens even approaching *auricularis* in size of bullæ. Furthermore, the bullæ of the new species show a degree of inflation that indicates a very distinct separation from the *aureus* stock. While superficially *auricularis* appears to be readily distinguishable from *aureus*, on the other hand, *aureus* is such a variable species that occasionally a specimen is found which resembles *auricularis* in general coloration. However, the presence of a well-developed, ochraceous-buff tuft of hairs behind the ear is not noted in the series of *aureus* now available. *Thomasomys prætor* and *T. popayanus* resemble *auricularis* to about the same degree as does *aureus* and differ from it in the same characters. *Thomasomys aureus altorum* Allen, which I believe further investigation will show to be a synonym of *aureus*, is readily separable upon the basis of the characters given above. *Thomasomys nicefori* Thomas I have not seen but, as its affinities are apparently with *aureus*, and no mention is made of inflated bullæ, I feel that it cannot affect the validity of the species here described.

The type and only specimen of *auricularis* was taken on the bank of a small mountain stream in the Cordillera de Chilla, a short range which extends eastward from the main Western Cordillera. Specimens of *Thomasomys* taken at no great distance from here, in the Western Cordillera at El Chiral, appear, at this time, to be typical *aureus*. The animal was captured in thick forest growth within the limits of the south temperate zone. The same trap line yielded two specimens of *Cænolestes caniventer*.

***Ichthyomys orientalis*, new species**

TYPE.—No. 62382, Amer. Mus. Nat. Hist.; ♀ (?) ad.; near Rio Napo, altitude, 3000 feet, Eastern Ecuador; September 15, 1921; collector, Ludovic Soderstrom. The type is a native-made skin and skull, both in fair condition.

GENERAL CHARACTERS.—A very large species, with highly developed aquatic specializations and sharply bicolored tail.

DESCRIPTION.—

Color above, grizzled black and buff with dark plumbeous tone of underfur showing through, the pelage composed of long, hard, glistening guard hairs and soft, short, woolly underfur; color below, dirty whitish.

Ears like back on upper half, whitish basally; forefeet dusky to digits, then whitish; hind feet near light drab, sparsely haired above, but with heavy marginal fringe of stiff, white hairs; feet broad and web-like; tail like back above, like underparts below, with clear-cut line of demarcation.

Skull large and strongly built, with flaring zygomata and moderate interorbital constriction.

MEASUREMENTS.—Taken from dried skin: total length, 390 mm.; tail vertebræ, 185; hind foot, 38.7. Skull, greatest length, 35.6 (34)¹; greatest breadth (zygomatic breadth), 17.5 (16); length of nasals, 11.5 (11); least interorbital breadth, 4.2 (5); length of palate, 18.2 (17.3); length of diastema, 8.4 (8.9); length of incisive foramina, 6.7 (6.5); length of upper molar series, 4.3 (4.4).

Ichthyomys orientalis needs detailed comparison with only one other species of the genus, namely, *stolzmanni*, none of the other fish-eating rats having a sharply bicolored tail. *I. orientalis* is about the same size as *tweedii*, the tail of which is unicolor, without any white, but an additional character of separation is seen in the hind feet. *I. tweedii* has a highly specialized hind foot but the foot of *orientalis* is even wider and is more heavily fringed with swimming hairs.

In the collections of the American Museum there is a specimen identified as *Ichthyomys stolzmanni*, collected by O. T. Baron at Cajabamba, Peru, in 1895. I suspect that this specimen will prove to be misidentified and probably an undescribed species. I have therefore based comparisons of *orientalis* and *stolzmanni* upon the type description of Thomas, *loc. cit.* *I. orientalis* appears to differ from *stolzmanni* in slightly larger size, coloration less brown, darker forefeet, smaller ears, more flaring zygomata, and greater interorbital constriction.

The type of *orientalis* is a gift to the American Museum from Mr. Ludovic Soderstrom of Quito, who received it from a native collector. Mr. Soderstrom has been particularly successful in collecting specimens of this rare group, and most of these rats in the collections of the different museums have passed through his hands. The type specimens of *Ichthyomys soderstromi*, *Anatomys leander*, *Neusticomys monticolus*, and now *Ichthyomys orientalis*, were all secured by Mr. Soderstrom, whose contributions to Natural Science have shown him to be unusually gifted as a collector.

The label attached to the type of *orientalis* is marked male, but the presence of well-developed mammæ, upon inspection of the skin, has caused me to indicate it as a female.

¹Measurements in parentheses are those of the type of *Ichthyomys stolzmanni* Thomas, Proc. Zool. Soc., 1893, p. 340.

SYLVILAGUS

The series of *Sylvilagus* brought from Ecuador by the American Museum expeditions number some twenty-five adult specimens and show the presence of at least three well-differentiated groups there. The *Sylvilagus andinus* group is sufficiently characterized by its sober coloration, inconspicuous nape patch, and grayish underparts, to form a logical assemblage of forms, while the habitat of *andinus*, its subspecies and related species, appears to be the elevated, grassy paramos; at least this has been the case throughout the collecting done in Ecuador. A second group is typified by *daulensis*, a dark, richly ochraceous species inhabiting the forested lowlands of the Guayas basin. The third group has been taken in the subtropical and south temperate forests, from 6000 to 9000 feet elevation. These specimens are marked in more contrasting colors than the *andinus* group, but are not nearly so ochraceous as *daulensis*. Between the first and third groups just enumerated there exist about the same superficial differences as may be noted between *Sylvilagus bachmani* and *S. auduboni* of the United States, *andinus* corresponding to *bachmani*, the third Ecuadorean group to *auduboni*.

I have been unable to find any described species of South American *Sylvilagus* corresponding to the Ecuador specimens of this third group and consequently two forms are here described. Unfortunately, the American Museum collections are weak in Neotropical Leporidae and hence lack good comparative material representing *brasiliensis*. Subspecies of *brasiliensis* have been described as ranging into the eastern Andes from Peru to Colombia but I feel certain that the two new forms under consideration can have little in common with them, because the Ecuador material is all from the western Andes.

***Sylvilagus kelloggi*, new species**

Fig. 3, C and E

TYPE.—No. 60515, Amer. Mus. Nat. Hist.; ♂ ad.; Guachanamá, Provincia de Loja, 9050 feet, Ecuador; October 8, 1920; collector, H. E. Anthony. The type is a skin and skull, both in good condition.

GENERAL CHARACTERS.—A good-sized species, with contrasted head markings and whitish underparts.

DESCRIPTION.—

Color above, grizzled cream-buff and black, the individual hairs tricolored, being plumbeous black at base, banded with about five millimeters of cream-buff and tipped with black; black heaviest along the back, sides clearer; crown, from nose to base of ears, cinnamon ticked with black; patch at nostrils and narrow superciliary band cream-buff; cheeks like sides, heavily lined with black; nape, clear cinnamon, extending about as far as the laid-back ears; ears, externally, bistre; hands and feet, above,

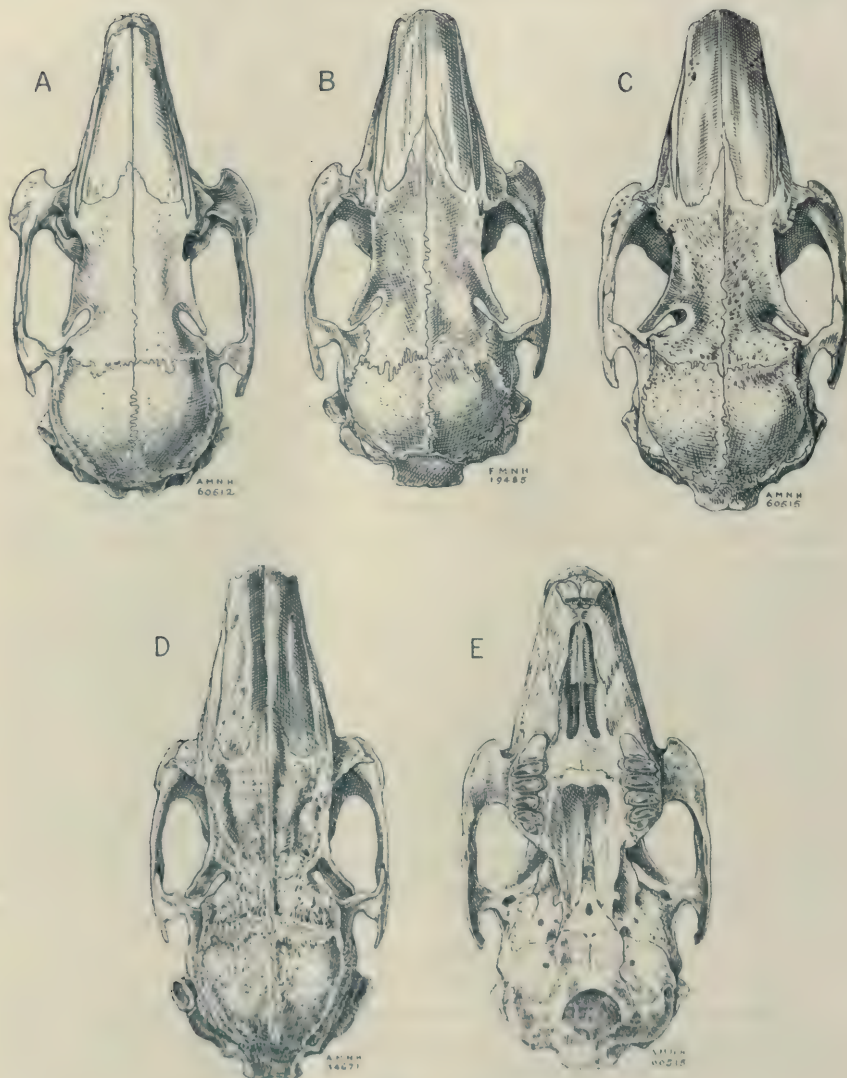


Fig. 3. Skulls of *Syvilagus*

- A. *Syvilagus andinus canarius*, Taraguacocha, Ecuador.
 B. *Syvilagus destlipi*, Myobamba, Peru.
 C, E. *Syvilagus kelloggi*, type.
 D. *Syvilagus daulensis*, type.

Figures natural size.

between cinnamon and cinnamon-buff; underparts practically clear white; throat patch cinnamon-buff; tail small and inconspicuous.

Skull moderately convex from parietals to end of nasals; nasals bowed distally; postorbital process on frontal long, slender and almost coalesced with short process from frontal and parietal; anteriorly the supraorbital margin of the frontal is practically entire, with only a very shallow notch; auditory bullæ normal, moderately inflated.

MEASUREMENTS.—Taken in the flesh: total length, 355 mm.; tail vertebrae, 25; hind foot, 82. Skull, greatest length, 67.1; length of nasals, 28.2; zygomatic breadth, 33; interorbital breadth, 13.2; breadth of braincase, 24.2; length of incisive foramina, 16.5; breadth of palatal bridge, 6.5; alveolar length of upper molar series, 12.5.

Besides the type, two other specimens were shot at Guachanamá on the same day, all three specimens agreeing quite well in coloration, the variable features being the amount of black on the back and the clearness of the white underparts, the general average of the light-colored underparts being nearer ivory-yellow than pure white. This species was also taken at El Paso, Provincia del Azuay, elevation about 8500–9000 feet.

Sylvilagus kelloggi may be easily distinguished from any other Ecuadorean *Sylvilagus* by its general color pattern, by the well-developed postorbital processes (in one of the Guachanamá series the postorbital process on the right has coalesced with a process coming off the fronto-parietal suture) and by the absence of a deep notch in the anterior border of the frontal. Skulls of *kelloggi* present a deeply pitted area along the posterior half, on the frontal, parietal, interparietal and occipital elements, a condition which appears to be not at all so noticeable in skulls of *andinus*, absent in *defilippi*, but well developed in *daulensis* (see Fig. 3).

Sylvilagus defilippi, described from Quijos, Ecuador, ranges along the eastern slope of the eastern Andes and could not possibly be identical with any *Sylvilagus* along the western Andes. A specimen identified by Dr. W. H. Osgood as *defilippi* and taken at Myobamba, Peru, has been kindly loaned to me for comparison (Fig. 3, B). While obviously distinct from *kelloggi*, notably in the characters of smooth, unpitted braincase, and less well-developed postorbital processes, there is however enough resemblance to cause me to believe that possibly the two forms are local representatives of a well-marked group analogous to the *andinus* group.

This handsome species is named for Mr. L. O. Kellogg, of the South American Development Company, Portovelo, Ecuador. Mr. Kellogg has displayed a keen interest in the work of the American Museum in

Ecuador, and during 1920 and 1921, when Portovelo was the headquarters for a museum expedition, he assisted in numerous helpful and thoughtful ways.

***Sylvilagus chillæ*, new species**

TYPE.—No. 60511, Amer. Mus. Nat. Hist.; ♀ ad.; trail from Salvias to Zaraguro, 6600 feet, Provincia del Oro, Cordillera de Chilla, Ecuador; August 29, 1920; collector, H. E. Anthony. The type is a skin and skull, the skin in good condition but the skull badly shattered and presenting only the superior elements in condition for comparison.

GENERAL CHARACTERS.—Very similar to *kelloggi* but much darker above and with broader frontal region.

DESCRIPTION.—

Color above predominately black, the hairs tricolored, plumbeous black at base, banded with warm buff, tipped with black; sides and flanks only slightly lighter in appearance than back; crown, from nose to base of ears, tawny sprinkled with black; nuchal patch small, tawny; conspicuous nostril patches, spot in front of eye, and spot just above and behind eye, between cream-color and cream-buff; cheeks, cream-buff densely sprinkled with black; ears bister; upper surfaces of hands and feet, between cinnamon and cinnamon-buff; color, below, ivory-yellow to pinkish buff; throat patch, cinnamon-buff.

Skull essentially like that of *kelloggi* but with very broad interorbital region, short, broad nasals, flat profile from parietals to end of nasals, margin of frontal continuous anteriorly to lacrymal without any conspicuous supraorbital notch.

MEASUREMENTS.—Taken in the flesh: total length, 382 mm.; hind foot, 81. Skull, length of nasals, 25.7; zygomatic breadth, 34; interorbital breadth, 16.3; alveolar length of upper molar series, 14.

Sylvilagus chillæ is a forest-dwelling form and was taken in the subtropical jungle along the southwestern flank of the Cordillera de Chilla. This forest lies in a belt of heavy rainfall and it is doubtless due to this fact that *chillæ* is such a dark, richly colored form. It may be immediately distinguished from the other rabbits of the Ecuadorean Andes by its superficial appearance, and its skull characters bear out the distinction. The closest relative of *chillæ* would appear to be *kelloggi*, and more abundant material may bring to light intergrades which will necessitate making *chillæ* a subspecies of *kelloggi*. Geographically, the facts hint strongly that *kelloggi* may represent, in the temperate, more depauperate forest, the same full species of which *chillæ* may be the representative in the subtropical, heavy forest. On the basis of the material available, the gap between *chillæ* and *kelloggi* seems, however, to be rather too great to allow such a linking up of the two forms.

The type and topotype of *chillæ* were shot at night, under the jacklight, when they came out of the heavy vegetation to feed about

the edges of a small clearing or "llano." Because of the dense cover in which these rabbits live, it would be almost impossible to shoot one under ordinary circumstances during the day.

***Lonchorhina occidentalis*, new species**

Fig. 4, B, natural size

TYPE.—No. 62101, Amer. Mus. Nat. Hist.; ♂ ad.; Puente de Chimbo, Provincia del Guayas, Ecuador, altitude 1200 feet; September 7, 1922; collector, G. H. H. Tate. The type is a skin and skull, both in fair condition.

GENERAL CHARACTERS.—A large-eared bat, with very tall tragus, wide interfemoral membrane and conspicuous whitish blotches on tips of wings.

DESCRIPTION.—

Color of fur above, uniform chestnut-brown; below cinnamon-brown; all membranes blackish, with the exception of irregular blotches of ivory-yellow on posterior margin of wings near tips, and, less extensively, on more proximal portions of wing margin.



Fig. 4. Face and head of *Lonchorhina*.

A. *Lonchorhina aurita*, San Esteban, Venezuela.
B. *Lonchorhina occidentalis*, type.

Ears very large and broad but not as tall as in *Lonchorhina aurita*; five transverse plications on posterior half of ear conch; tragus very tall and slender; nose-leaf, while not as tall as in *aurita*, very high and reaching almost to tips of ears, sparsely haired basally.

Wings large and broad, naked everywhere, but fur of body extending along forearm about midway; interfemoral membrane very extensive and supported by well-developed calcaria and long tail which extends to extreme tip of membrane.

Skull normal for the genus and very similar to that of *aurita*.

MEASUREMENTS.—Taken in the flesh: total length, 110 mm.; tail vertebrae, 51; hind foot, 15; taken from the dry skin; length of forearm, 48.7 (*aurita*, three specimens, 51.7, 51.3, 50.9); height of ear from notch, 25.5 (*aurita*, 29.3); height of tragus, 11.6 (14.4); height of nose-leaf, 18.2 (21.7). Skull, greatest length, 20; zygomatic breadth, 11; mastoid breadth, 10.4; interorbital breadth, 4.8; length upper toothrow, C-M³, 6.8.

As far as I can ascertain, only one species of *Lonchorhina* has been described, *Lonchorhina aurita*. The geographical range of this form, as known, is the West Indies and the northern corner of South America.

Specimens are rare in collections. Fortunately, the American Museum has a series of three collected by Mr. Carriker at San Esteban, Venezuela. These three specimens all agree in quite uniform coloration, show no traces of whitish wing-markings, and have the nose-leaf equal to or slightly exceeding the ears in height (Fig. 4, A).

The *Lonchorhina* here described displays all of the well-marked characters which distinguish the genus and superficially appears to be very similar to *aurita*. The whitish wing-blotching, which is the most immediate external character of separation, does not have the appearance of being an individual or fortuitous marking because both wings are blotched in the same area, although not closely symmetrical. However, the specific identity of *occidentalis* does not rest entirely upon the wing markings, and the additional characters of shorter nose-leaf, lower ears, slightly shorter forearm, and blacker ears and wing membranes demonstrate the presence in Ecuador of a hitherto unknown species of *Lonchorhina*. Probably *occidentalis* is the western representative of the genus and the specific name is based upon this assumption.

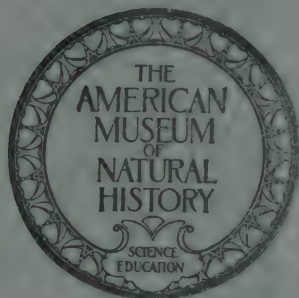
AMERICAN MUSEUM NOVITATES

No. 56



NOTES ON SOME BIRDS OF TROPICAL AFRICA
WITH DESCRIPTIONS OF THREE
NEW FORMS

BY JAMES P. CHAPIN



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NOTES ON SOME BIRDS OF TROPICAL AFRICA, WITH DESCRIPTIONS OF THREE NEW FORMS¹

BY JAMES P. CHAPIN

THE SUBSPECIES OF THE NARINA TROGON

Apaloderma æquatoriale Sharpe, though repudiated by its own sponsor, has proved to be a species distinct from the Narina trogon of South Africa. My examination of Dr. Sharpe's type in the British Museum reveals that my *A. minus*² is a synonym of *æquatoriale*, earlier described from the forests of the Cameroon. Differences in our methods of measuring the wing led me to believe that *minus* had a shorter wing;

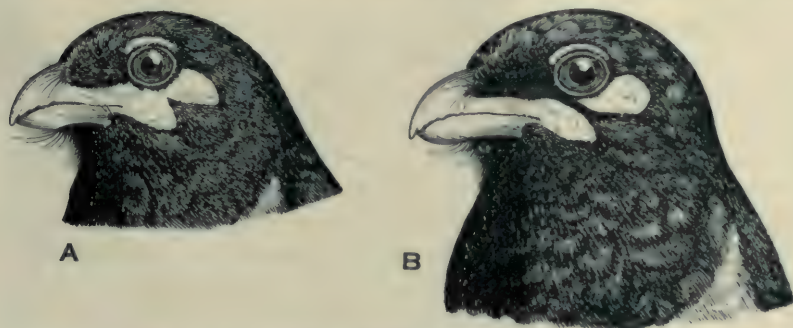


Fig. 1. Heads of two African Trogons, to show extent of bare cheek patches.

A, *Apaloderma æquatoriale*, adult male, from Ituri district. B, *A. narina brachyurum*, adult male, from Ituri district. From sketches of freshly killed examples, by the author. Three-fourths natural size.

but I now find that *æquatoriale* ranges from the Southern Cameroon eastward to the Ituri, with so little difference in size that not even a subspecific distinction is tenable. One of its salient characters has not yet been placed on record. The narrow line of green feathers which in *A. narina* crosses the cheeks, from lores to ear-coverts, and separates the two patches of bare green skin, is interrupted in *æquatoriale* so that the two bare patches—here yellow—are confluent. We thus have a ready means of distinguishing the two species.

¹Scientific Results of the American Museum Congo Expedition. Ornithology, No. 8.

²1915, Bull. Amer. Mus. Nat. Hist., XXXIV, p. 510.

When describing *minus* I called attention to the small size of representatives of *Apaloderma narina* in the Ituri Forest, and also (on page 510) to the gray breast of females of the latter species. The longer-tailed *narina* of South Africa and many other parts of the continent has in the adult female a cinnamon color on the breast and lores which is not very different from that in *aequatoriale*. Dr. V. G. L. van Someren has recently mentioned the grayer breasts of Uganda specimens,¹ as compared with typical females from South Africa; and now that I have gone over the series in many museums of Europe and America, I am able to show that the typical form of *Apaloderma narina* is a bird of woods and gallery forests in the savanna districts of East and South Africa. *A. narina constantia* is its representative race in Upper Guinea; and, although the rain forest of Lower Guinea is largely occupied by *A. aequatoriale*, it harbors also a short-tailed race of *narina*, with a gray breast in the female. The latter ranges from Southern Cameroon east to the Budongo Forest in Uganda.

The forest race of *narina* is therefore the form which still needs a name. Before proposing a new one, we must assure ourselves that *A. rufiventre* of Dubois² does not apply. His type was an adult male from "Tanganyika, 1884," collected by Storms, which fortunately is still preserved in the Brussels Museum. The dull reddish coloration for which it was named I found to have completely disappeared, so that the specimen looks like any old bleached skin of *narina*, save that the green of the upper back had been turned bronze, as though by some liquid. As Dubois stated, the line of feathers across the cheek is complete. According to my measurements the wing (straightened) measures 135 mm., the tail, 175; and, because of the length of tail especially, I assign it to *Apaloderma narina narina*. The dimensions given by Dubois are: wing, 132; tail, 170. A female specimen, also taken by Storms near Tanganyika, has a wing of 134 mm. and tail of 178.

For purposes of comparison I add a table of measurements which shows the size relations of the various forms of the present genus of trogons.

¹1922, *Novitates Zoologicae*, XXIX, p. 72.

²1890, *Proc. Zool. Soc. London*, p. 900.

		WING (straightened)	TAIL
<i>Apaloderma narina narina</i>	35 males	129-145	160-200
<i>Apaloderma narina narina</i>	7 females	128-144	164-195
<i>Apaloderma narina constantia</i>	2 males	126-133	163-164
<i>Apaloderma narina brachyurum</i>	19 males	122-136	146-166
<i>Apaloderma narina brachyurum</i>	11 females	122-136	149-170
<i>Apaloderma æquatoriale</i>	27 males	115-126	136-161
<i>Apaloderma æquatoriale</i>	7 females	110-125	140-156

The average differences in measurements are well marked, but overlapping is considerable. With further aid from the color characters, almost every specimen of *narina* can be definitely referred to its proper subspecies. The interrupted feathering of the cheeks always betrays *Apaloderma æquatoriale*.



Fig. 2. Map of Africa, showing the ranges of all forms of *Apaloderma*.

Localities from which *A. æquatoriale* is known are indicated by dots; but its range is doubtless continuous, though a little more restricted than that of *A. n. brachyurum*.

***Apaloderma narina brachyurum*, new subspecies**

SUBSPECIFIC CHARACTERS.—Similar to *A. narina narina* of southern Africa, but the wing averaging 8 mm. shorter, and the tail 23 mm. shorter. The adult female differs also from that sex of typical *narina* in having the chest and lores not washed with cinnamon, but clear gray with distinct metallic green reflections at the sides. Though agreeing more closely in size with *A. n. constantia*, the male of the present form differs in having the wing-coverts and secondaries of a darker color, the whitish vermiculations fewer and finer.

TYPE.—♂ adult, No. 158881, Amer. Mus. Nat. Hist.; Avakubi, Ituri District, Belgian Congo, September 27, 1913 (Lang and Chapin).

MEASUREMENTS OF THE TYPE.—Wing (straightened), 125 mm.; wing (chord), 120; tail, 148; exposed culmen, 17.5; metatarsus, 14.

DISTRIBUTION.—From the coast of Southern Cameroon and Spanish Guinea through the rain forest of the Congo basin to the Upper Ituri, occurring also in the heavier forests of Uganda (the Budongo Forest, for example) and eastward to Chagwe.

SPECIMENS EXAMINED.—Cameroon: Efulen, 1; Bipindi, 1. Spanish Guinea: Asseng, 1. Belgian Congo: Banalia, 1; Avakubi, 11; Gamangui, 3; Bafwabaka, 2; Pawa, 1; Medje, 1; Poko, 2; Ituri Forest near Kilo, 1; Forest north of Beni, 1. Uganda: Budongo Forest, 5; Kwa Kitola, 1.

**SWALLOWS OF THE GENUS *PSALIDOPROCNE* IN THE
NORTHEASTERN CONGO**

In the forested parts of the Ituri and southern Uelle districts we found not only the eastern race of the short-tailed species, *Psalidoprocne nitens centralis* Neumann, but two other species with deeply forked tails, one having dark gray under wing-coverts, the other white ones. The two latter seem to occupy separate but adjacent territories, for the one darker beneath the wings was found at Avakubi and westward through the forest area at least as far as Stanleyville and the lower Aruwimi River. At Medje, a post which occupies a clearing near the northern edge of the Ituri Forest, its place is taken by the species with white beneath the wing, the latter extending out into the savannas of the Uelle drainage at least to Niangara, Nzoro, and Faradje. On the White Nile it must in turn be replaced by *P. albiceps*, which alone has been taken in the Lado Enclave. To the northward in the Bahr-el-Ghazal Province no species of the genus has as yet been reported.

The long-tailed *Psalidoprocne* of Avakubi, with dark-gray axillary plumage, has already been referred to *P. bamingui* Alexander by Bannerman,¹ who had specimens collected by Dr. C. Christy. That these birds of the Ituri do agree rather closely with Alexander's type I have con-

vinced myself; but the agreement extends even further, to the type of *P. chalybea* Reichenow, from Victoria, Cameroon, which I have compared with one of our specimens. Though realizing what small differences in the tone of the gloss of the plumage, in the color of the under wing-coverts, or in the shape of the tail, may be of importance in this genus, I prefer to call all these specimens, from the western Cameroon to the Ituri, *P. chalybea* Reichenow. It may be added that in the broad area separating the Bamingui River and the Aruwimi, two adults of *chalybea*, identified by Professor Reichenow, were collected by Schubotz at Yakoma (on the upper Ubangi River) and are now in the Frankfort Museum,

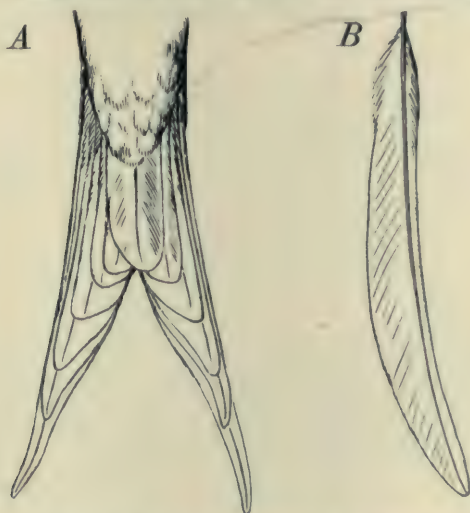


Fig. 3. Differences in the tails of two species of *Psalidoprocne*.

A, Tail of *P. mangbettorum* (adult male, type specimen) seen from above. B, Right outermost tail-feather of *P. oleaginea* (drawn from the type, an adult male, in the Museum of Lord Rothschild at Tring). Both figures three-fourths natural size.

where I have examined them. According to Professor Reichenow,¹ the species also ranges westward to Liberia. He had compared an adult bird from Sekondi (Gold Coast) with his type, but I feel uncertain as to the Liberian record.

Even greater difficulty was experienced in naming the species from the Uelle with white axillaries, for its nearest ally has proved to be *P. oleaginea* Neumann,² which Professor Reichenow swept inconsiderately into the synonymy of *P. petiti orientalis*.³ Since examining the type and

¹1903, 'D'e Vögel Afrikas,' II, p. 428.

²1904, Orn. Monatsber., XII, p. 144 (Kaffa, in S. Abyssinia).

³1905, 'Die Vögel Afrikas,' III, p. 829.

two other males of *oleaginea* in the museum at Tring I am convinced of their distinctness from *orientalis*, because of differences in body color and the shape of the outer rectrices. I should not regard *oleaginea* as a subspecies of *orientalis*, though its describer did; nor would I follow Professor Reichenow in calling *orientalis* a race of *petiti*. Many of these saw-winged swallows, despite their slight characters, seem to be stable forms and worthy of binomial designation as long as actual intergradation cannot be proved.

With regard to *P. blanfordi* Blundell and Lovat,¹ from Southern Abyssinia, Neumann had seen the type in London² before describing *oleaginea* as new. He thought that *blanfordi* would not prove separable from *pristoptera*.



Fig. 4. Map to illustrate the ranges of three species of *Psalidoprocne*: *chalybea*, *mangbettorum*, and *oleaginea*, as known at present.

¹1899, Bull. British Orn. Club, No. LXVI, November.

²1905, Journal f. Orn., LIII, p. 203.

Psalidoprocne orientalis Reichenow of East Africa differs from the allied species of the Uelle in having both wings and tail longer, the green gloss of the body plumage duller, and the under wing-coverts grayer in places. *P. oleaginea* Neumann is closer, but still differs in that the oily-green gloss of its body is slightly browner, when viewed in a good light. Its wings are longer, the outermost rectrices taper less, or are broader toward the tip; but the best distinction of all is seen in the under wing-coverts. The "axillaries" and under wing-coverts are white in *oleaginea*, with the exception of the greater under primary-coverts, which are almost wholly fuscous. These, the longest of the under wing-coverts, are white like the others in the bird of the Uelle, which I propose to name as follows.

***Psalidoprocne mangbettorum*, new species¹**

TYPE.—♂ adult, No. 159746, Amer. Mus. Nat. Hist.; Medje, Ituri district, Belgian Congo, March 20, 1910 (Lang and Chapin).

DESCRIPTION OF TYPE.—Head and body, above and below, black with a rich oily-green gloss. Quills of wings and tail similar but with less luster. Under wing-coverts entirely pure white, including the lengthened marginal coverts commonly termed "axillaries." Outermost primary in this sex has of course a pronounced saw edge; and the tail is deeply forked, with broad middle feathers, the long outermost ones tapering narrowly at the tip.

MEASUREMENTS OF THE TYPE.—Wing, 97 mm.; tail, 89 (middle pair of rectrices 45); exposed culmen, 5; metatarsus, 9.5. Four other males measure as follows: wing, 97.5–100.5; tails, 85–92.5 (middle feathers 43–46).

DISTRIBUTION.—Extends, so far as known, from the neighborhood of the Nepoko River northward and northeastward to the Congo-Nile divide, possibly a little way into the Bahr-el-Ghazal.

THE LARGEST SUBSPECIES OF *PYRENESTES OSTRINUS*

Professor Neumann,² Mr. Bannerman,³ and other writers, have applied the name *ostrinus* Vieillot to the largest form of this extremely variable weaver-finch, such as occurs in Northern Nigeria. Vieillot's type, however, is still preserved in the Paris Museum of Natural History, where Monsieur J. Berlioz kindly showed it to me. It is not so large a bird, but resembles more closely in dimensions the specimens from the Eastern Ituri district which Neumann⁴ referred to *P. o. centralis*. My measurements of the type of *ostrinus* (an adult male) are: wing, 64 mm.; tail, 48; bill (from nostril), 10; width of lower mandible at base, 15;

¹From the Mangbetu tribe, inhabiting a part of the same country.

²1910, Journ. f. Orn., LVIII, p. 527.

³1922, Rev. Zool. Africaine, IX, p. 308.

⁴1910, Journ. f. Orn., LVIII, p. 529.

metatarsus, 20. It is labelled "Afrique Occidentale," and came presumably from either Lower Nigeria or the Gaboon Coast, in both of which places individuals of similar size have since been collected.

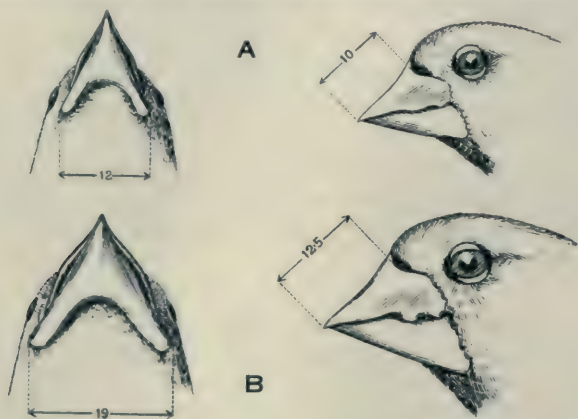


Fig. 5. Beaks of the large and small races of *Pyrenestes ostrinus*, to show the degree of difference in size, as well as the method of measuring.

A, *P. o. rothschildi*, adult male from Avakubi, Ituri District, Belgian Congo. B, *P. o. maximus* adult male from Faradje, Upper Uelle District. Natural size.

The larger form, with the mandible from 17.5 to 20 mm. wide, besides inhabiting Northern Nigeria, has been collected by Dr. V. G. L. van Someren in parts of Uganda, and by the Congo Expedition of the American Museum at Faradje in the Upper Uelle district and at Stanleyville on the Upper Congo. It apparently lacks a subspecific name, and I therefore designate it as follows.

***Pyrenestes ostrinus maximus*, new subspecies**

SUBSPECIFIC CHARACTERS.—Like *P. ostrinus ostrinus* Vieillot, but both sexes much larger, the beak especially far stouter.

TYPE.—♂ adult, No. 162176, Amer. Mus. Nat. Hist.; Faradje, Upper Uelle District, Belgian Congo, April 14, 1911 (Lang and Chapin).

DESCRIPTION OF TYPE.—Coloration the same as in the typical race: body mostly black, with head, chest, and stripes down sides of breast bright scarlet; upper tail-coverts of same color, and upper surface of tail darker red. Under tail-coverts faintly spotted with red, but mostly black. Wing, 73 mm.; tail, 55.5; bill (from nostril), 12; width of mandible at base, 20.1; metatarsus, 22.5.

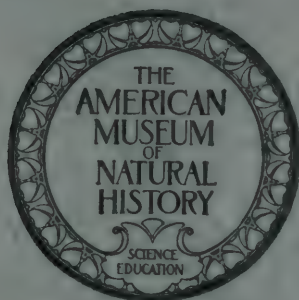
A paper dealing in full with all the species and races of the genus *Pyrenestes*, and their distribution, has been submitted to the Editor of the Bulletin of the American Museum of Natural History for publication in a forthcoming volume.

AMERICAN MUSEUM NOVITATES

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NEW AFRICAN FISHES

By JOHN TREADWELL NICHOLS



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NEW AFRICAN FISHES

BY JOHN TREADWELL NICHOLS

Following the publication of its Bulletin on Congo fishes, Monsieur A. Baudon kindly sent this Museum some small fresh-water fishes from French Equatorial Africa, which are interesting to compare with the large collections brought back by The American Museum of Natural History Congo Expedition a few years ago. Among them are three previously undescribed species as follows.

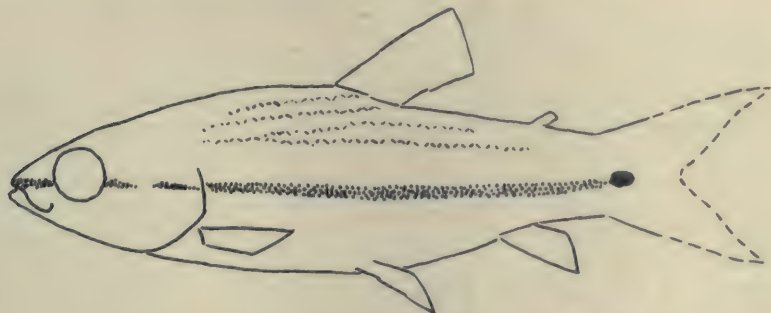


Fig. 1. *Nannæthiops angustolinea*. 19 mm. to base of caudal.

***Nannæthiops angustolinea*, new species**

The type, No. 8106 American Museum of Natural History, from Fort Crampel, Gribingui, West Africa, August 1919, measures 19 mm. to base of caudal. Depth, 3.2 in this (standard) length; head, 3.0. Eye, 3.5 in head; snout, 4.0; maxillary, 3.7; interorbital, 3.2; depth of caudal peduncle, 2.3. Dorsal origin equidistant between base of caudal and front of pupil; pectorals reach $\frac{3}{4}$ distance to ventrals; ventrals $\frac{2}{3}$ distance to anal; caudal forked. Dorsal with 11, anal with 9 rays. Adipose small but well developed. Scales ciliate, 33. The 7 front ones with tubes; 11 rows between dorsal and ventral. A bold dark stripe from snout to base of caudal where it ends in a conspicuous, longitudinally oval black spot. Several faint, narrow dark streaks higher up on the side between the rows of scales, about 4 below the dorsal.

Besides the type, 2 specimens, 17 and 20 mm. long, have the same data.

In this little fish the dorsal origin is more posterior than in related species of the genera *Nannæthiops* and *Neolebias*, and its color pattern, usually diagnostic in these species, is somewhat different from that of those described.

***Barilius engrauloides*, new species**

The type, our only specimen, No. 8107 American Museum of Natural History, from the Ubangui River at Bangui, West Africa, July 1919, is 67 mm. long to base of caudal. Depth, 4.0 in this (standard) length; head, 3.6. Eye, 3.4 in head; snout, 3.4; maxillary, 2.2; interorbital, 4.6; least depth of peduncle, 2.7; longest dorsal ray, 2.5; longest anal ray, 1.8; pectoral, 1.0; ventral, 1.6. Dorsal with 9



Fig. 2. *Barilius engrauloides*. 67 mm. to base of caudal.

rays; anal with 10. The dorsal origin is a little nearer the base of caudal than posterior margin of opercle; pectoral just reaches ventral, which extends $\frac{2}{3}$ the distance to anal; anal origin under center of dorsal. The jaws are equal, ventral outline slightly more convex than dorsal. Lateral line complete, 37; 6 rows of scales between lateral line and dorsal, 2 between same and ventrals; 12 around caudal peduncle.

Color in alcohol pale, an irregular row of 11 dark dots along the side on a level with the eye.

This fish has the dorsal origin very far back for a *Barilius*. It seems to be more or less intermediate between species of that genus and of *Engraulicypris*.

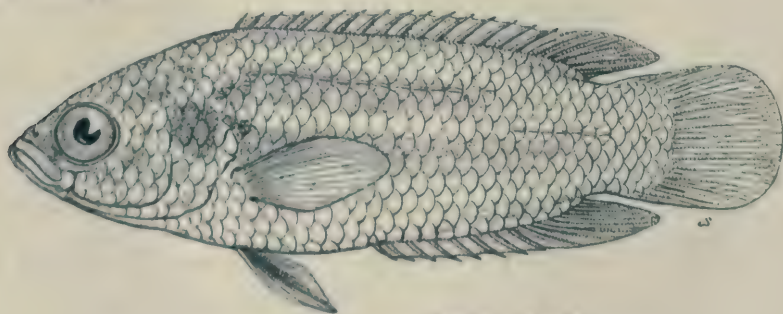


Fig. 3. *Anabas lineatus*, type. 37 mm. to base of caudal.

***Anabas lineatus*, new species**

The type, our only specimen, No. 8108 American Museum of Natural History, from French Equatorial Africa, is 37 mm. long to base of caudal. Depth, contained

3.0 in this (standard) length; head, 2.9. Eye, 3.6 in head; maxillary, 3.3; inter-orbital, 4.0; least depth of peduncle, 2.2; longest dorsal spine, 4.0; longest dorsal ray, 2.0; pectoral, 1.6; ventral (which is pointed and just does not reach anal origin), 2.0; longest anal spine, 4.5; longest anal ray, 1.8. Head bluntly pointed, the greatest depth of the body at the origin of the ventrals, peduncle short and distinct. The only serrulations about the head 4 or 5 small teeth on the edge of the opercle opposite the base of the pectoral. Dorsal XVI, 7; anal VIII, 10. Scales 27; 12 cross-series between dorsal and ventrals. Ground color in alcohol pale, darker along the back, two longitudinal parallel dark shades separated by a narrow pale line along the sides, ventrals and vertical fins more or less blackish.

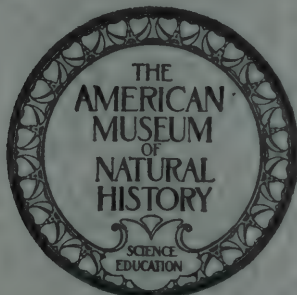
Differs most strikingly from *A. nanus* in color, that species having bold dark crossbands.

AMERICAN MUSEUM NOVITATES

No. 58

DESCRIPTIONS OF PROPOSED NEW BIRDS
FROM BRAZIL AND PARAGUAY

By GEORGE K. CHERRIE AND (Mrs.) E. M. B. REICHENBERGER



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AMERICAN MUSEUM NOVITATES

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DESCRIPTIONS OF PROPOSED NEW BIRDS FROM BRAZIL AND PARAGUAY

BY GEORGE K. CHERRIE AND (MRS.) E. M. B. REICHENBERGER

This is the third preliminary report on the Roosevelt Collections made by Mr. Cherrie in the years 1913 and 1916. The authors are indebted to the authorities of the natural history museums of Munich, Frankfort, Berlin, Vienna, Tring, and South Kensington for affording Mrs. Reichenberger opportunity to study material in connection with the preparation of the present paper.

All measurements are given in millimeters and made with dividers, the wing retaining the curvature of its primaries as well as the bent position of the manus taken in drying.

Tangara cyaneicollis melanogaster, new subspecies

SUBSPECIFIC CHARACTERS.—Similar to *Tangara cyaneicollis cæruleocephala* from northern and central Peru, but with very little if any bluish wash on lower flanks, the whole abdomen being nearly uniform black, whereas the rump is more or less conspicuously mixed with verditer blue.

TYPE.—No. 128220, Amer. Mus. Nat. Hist.; ♂ ad.; Utiarity near Salto Bello, Papagaio River, alt. 1500–2500 ft., Matto Grosso, Brazil; January 30, 1914; George K. Cherrie. Wing, 66; tail, 44.5; exposed culmen, 10.5.

SPECIMENS EXAMINED

Tangara cyaneicollis melanogaster.—BRAZIL: Matto Grosso,—Engenho do Gama, 4 ♂, 1 ♀, Utiarity, 1 ♂, 3 ♀, Tapirapoan, 1 ♂, 1 ♀, Doze Octubre, 1 ♀.

Tangara cyaneicollis cyaneicollis.—BOLIVIA (north): Yungas,—Songo, 1 ♂. PERU (southeast): Andes of Carabaya, Yahuarimayo, 2 ♂; Chaquimayo, alt. 3000 ft., 2 ♂, 1 ♀; Rio Inambari, 3 ♂, 1 ♀; Santo Domingo, 3 ♂, 3 ♀; La Pampa, 1 ♂; Candamo, 2 ♂; Rio Javara, 3 ♂, 1 ♀.

Tangara cyaneicollis cæruleocephala.—PERU (north): Nuevo Loreto, eastern Tayabamba, 2 ♂; Piña, 1 ♀. PERU (central): Chanchamayo, alt. 3300–5000 ft., 1 ♂, 1 ♀, 1 ♀ juv.; Prov. Huanuco,—Pozuzo, 1 ♂. ECUADOR (east): Rio Napo, San José, 1 ♀ juv.; Zamora, 3 ♂, 3 ♀.

Tangara cyaneicollis granadensis.—COLOMBIA: Bogotá Collection, 3 ♂, 1 ♀; Cauca Valley, 1 ♂; La Candela, 1 ♀; Andalucia, 1 ♂; near San Agustín, 2 ♂, 2 ♀.

Tangara cyaneicollis hannahæ.—VENEZUELA (western): Tachira,—San Cristóbal, 3 ♂, 1 ♀; Mérida, 1? (Cassin's type, Academy of Natural Sciences, Philadelphia).

This interesting new race resembles *Tangara cyaneicollis cæruleocephala* in the possession of a strong indigo blue tinge on the middle of the

MEASUREMENTS (Extremes and Averages)

	Wing	Tail	Exposed Culmen	Collection
<i>Tangara cyaneicollis melanogaster</i>				
Brazil: Matto Grosso	6 ♂ 64.5-70. (66.5) ¹	44. -47.5 (44.9)	9.5-10.5 (10.)	Amer. Mus. Nat. Hist.
" "	6 ♀ 62.5-66.5 (64.1)	41. -46.5 (43.5)	10. -10.5 (10.3)	" "
<i>Tangara cyaneicollis cyaneicollis</i>				
North Bolivia: Yungas, Songo	1 ♂ 69.5	46.5	10.	Munich Museum
Southeast Peru	4 ♂ 67. -70. (68.5)	44. -47.5 (46.1)	10. -11. (10.5)	" "
" "	1 ♀ 67.	48.	10.	" "
<i>Tangara cyaneicollis ceruleocephala</i>				
Eastern Ecuador: Zamora	3 ♂ 67. -69. (67.6)	43.5-45.5 (44.3)	10. -11. (10.5)	Amer. Mus. Nat. Hist.
North Peru: Nuevo Loreto	1 ♂ 67.5	47.5	9.	Munich Museum
" "	1 ♂ 68.5	48.5	9.5	" "
Eastern Ecuador: Zamora	3 ♀ 65. -68.5 (66.6)	43. -44. (43.6)	9.5-10.5 (10.)	Amer. Mus. Nat. Hist.
Central Peru: Chanchamayo	1 ♀ 63.5	44.	8.5	" "
<i>Tangara cyaneicollis grandensis</i>				
Colombia	7 ♂ 67. -70. (68.8)	44. -49. (47.)	8.5-11. (10.1)	Munich Museum
Colombia: La Candelaria	1 ♀ 67.	48.	9.5	" "
" Bogota Collection	1 ♀ 66.5	46.5	10.	" "
<i>Tangara cyaneicollis hannahiae</i>				
Venezuela: San Cristobal	3 ♂ 65.5-67.5 (66.5)	46. -50. (48.)	9.5-10.5 (9.8)	Berlepsch
" "	1 ♀ 67.	46.5	10.5	" "
" Mérida (Cassin's type)	1 ? 65.	50.	8.5	Philadelphia Academy of Nat. Sci.

¹Averages given in parentheses.

throat, in the color of the upper part of the head, and in the decidedly golden shoulder patch. When compared with *Tangara cyaneicollis cyaneicollis*, the upper part of the head is of a darker tinge, slightly washed with purple about the forehead and across the nape. In *Tangara cyaneicollis cæruleocephala*, however, the whole of the lower breast and abdomen is mainly deep purplish blue, shading into azure blue on the flanks, whereas in the new race the entire belly is either wholly black or slight obsolete edges of dull blue show only on some of the feathers of the flanks and anal region, this being especially noticeable in males in first annual plumage and in females. In the absence of blue on the belly, *Tangara cyaneicollis melanogaster* recalls *Tangara cyaneicollis hannahæ*, from the mountains of Venezuela (Tachira to Carabobo). *T. c. hannahæ*, however, may immediately be recognized by the deeper velvety black of the under parts, the much clearer verditer blue crown, without a purplish tinge on forehead and neck; by the decidedly lighter, more bronzy or silvery greenish shoulder patch; and by the silver greenish rump without any bluish admixture.

Tangara cyaneicollis melanogaster seems to have a peculiarly restricted range, it being as yet known only from the western portion of Matto Grosso.

Eupsittula aurea major, new subspecies

SUBSPECIFIC CHARACTERS.—Indistinguishable in coloration from *Eupsittula aurea aurea* from various Brazilian localities but wing and tail longer.

TYPE.—No. 149401, Amer. Mus. Nat. Hist.; ♂ ad.; Puerto Pinasco, Rio Paraguay, Paraguay; October 20, 1916; George K. Cherrie. Wing, 159.5; tail, 142; exposed culmen, 20.5.

Because it seems desirable to have a specified type locality for *Eupsittula aurea aurea*, a bird of widespread range, we formally propose Bahia, eastern Brazil.

SPECIMENS EXAMINED

Eupsittula aurea major.—PARAGUAY: Puerto Pinasco, 1 ♂ (the type), 1 ♀; Concepcion, 1 ♂.

Eupsittula aurea aurea.—BRAZIL: Bahia,—2 ♂, 1 ♀; West Minas Geraes,—Agua Suja near Bagagem, 1 ♀, 1 ?; Matto Grosso,—Palmiras, 1 ♂, 1 ♀, Tapirapoan, 1 ♂. José Bonifacio, 1 ♂; Maranhão,—Miritiba, 1 ♂, 1 ♀; Isle of Marajó,—Cachoneira, 1 ♂, 1 ♀; Fazenda Ararý on the upper Rio Ararý, 1 ♂, 1 ♀; Tuyuyu, 1 ♂, 1 ♀; Natal, 1 ♀.

Measurements

		Wing	Tail	Culmen	Collection
<i>Eupsittula aurea aurea</i>					
Brazil: Bahia	♂	142.	132.5	18.5	Amer. Mus. Nat. Hist.
" "	♂	139.5	125.5	18.	Munich Museum
" "	♀	140.	1	17.5	Amer. Mus. Nat. Hist.
" Minas Geraës, Agua Suja near Bagagem	♀	146.	145.5	17.5	Munich Museum
" Minas Geraës, Agua Suja near Bagagem	?	148.5	141.	18.	" "
" Matto Grosso, Palmiras	♂	139.5	123.	18.	Amer. Mus. Nat. Hist.
" " " "	♀	141.	126.	17.5	" " " "
" " " Tapirapoan	♂	141.5	125.5	18.5	" " " "
" " " José Boni- facio	♂	147.5	136.	16.	" " " "
" Maranhão, Miritiba	♂	139.	118.5	19.5	Munich Museum
" " " "	♀	145.5	126.5	20.	" "
Isle of Marajó, Cachoneira	♂	145.	135.5	20.	" "
" Fazenda Ararý	♂	148.	1	21.5	" "
" Tuyuyu	♂	141.	128.5	19.5	" "
" " "	♀	142.5	134.5	20.	" "
" Fazenda Ararý	♀	143.	1	20.	" "
" Cachoneira	♀	137.5	128.	22.	" "
" Natal	♀	138.	131.	19.	" "
<i>Eupsittula aurea major</i>					
Paraguay: Puerto Pinasco (the type)	♂	159.5	142.	20.5	Amer. Nat. Nat. Hist.
" Puerto Pinasco	♀	155.	142.	19.	" " " "
" Concepcion	♂	153.	137.5	18.5	Munich Museum

Manacus manacus subpurus, new subspecies

SUBSPECIFIC CHARACTERS.—Under tail coverts white as in *Manacus manacus purus*, but with the gray area on sides and flanks more extensive and deeper in color, corresponding to the gray sides and flanks of *Manacus manacus trinitatis*. There is also a faint grayish wash on breast and abdomen. The blackish area on the back is more extended than in *Manacus manacus purus*, and the gray color of rump and upper tail coverts is darker.

TYPE.—No. 127944, Amer. Mus. Nat. Hist.; 1 ♂; Tapirapoan, Siputuba River, Matto Grosso, Brazil; January 19, 1914; George K. Cherrie. Wing, 51; tail, 30.5; exposed culmen, 9.

SPECIMENS EXAMINED

Species with White Under Tail Coverts

Manacus manacus subpurus.—BRAZIL: Matto Grosso,—Tapirapoan (type), 1 ♂, Mutum Cavallo, 1 ♂, Santa Isabel (Rio Preto; right bank of the Rio Madeira), 1 ♂, Engenho do Gama, 1 ♂, 1 ♀, S. Vicente, 1 ♀.

Manacus manacus purus.—BRAZIL: Santarem, 6 ♂; Baião, 2 ♂; Providencia, 1 ♂; Pará, 1 ♂; Pedreira near Pará, 1 ♂; Utinga near Pará, 2 ♂; Calama (Rio Machados), 1 ♂; Borba, 3 ♂¹; Maranhão,—Miritiba, 2 ♂.

Species with Gray Under Tail Coverts

Manacus manacus manacus.—FRENCH GUIANA: Cayenne, 1 ♂. BRITISH GUIANA: Demarara, 1 ?; Wismar, 4 ♂; Rockstone (Essequibo River), 3 ♂; Faro, 1 ♂; Monte Alegre, 1 ♂.

Manacus manacus trinitatis.—TRINIDAD: Princetown, 5 ♂.

Manacus manacus abditus.—COLOMBIA: Santa Marta, 11 ♂; Puerto Valdivia, 1 ♂; Malena, 1 ♂.

Manacus manacus gutturosus.—BRAZIL: Bahia,—7 ♂; São Paulo,—Fazenda Cayoá (Salto Grande, Rio Paranapanema), 1 ♂, Sebastião, 1 ♂; Espírito Santo,—Victoria, 2 ♂.

Manacus manacus flaveolus.—COLOMBIA: Bogotá, 3 ♂; within 20 miles of Honda, 6 ♂; Chicoral, 5 ♂.

Manacus manacus leucochlamys.—ECUADOR: Coast of Manabí, 3 ♂; Esmeraldas, 6 ♂.

Manacus manacus bangsi.—COLOMBIA: Barbaças, 4 ♂.

Manacus manacus interior.—VENEZUELA: Maripá, 5 ♂. COLOMBIA: Villavicencio, 1 ♂ (type, A. M. N. H.); Bogotá Collection, 3 ♂. ECUADOR: Rio Napo, 1 ♂.

This new subspecies is intermediate geographically, as well as in its subspecific characters, between *Manacus manacus purus* (from Santarem, type locality, and the whole lower Amazon region) and *Manacus manacus gutturosus* (from southeastern Brazil). As far as we know, *Manacus manacus subpurus* is confined to the central portion of Brazil. On the upper parts our new subspecies resembles *Manacus manacus manacus* in the extent of the black area and in the gray color of the rump and tail. It differs, however, in having the nape unbarred. We may therefore conclude that *Manacus manacus subpurus* ranges from at least Calama, on the right bank of the Rio Madeira, down to western Matto Grosso, while specimens of *Manacus manacus purus* are found at Borba on the right bank of the lower Madeira, east to Maranhão.²

¹The three males from Borba, Rio Madeira, agree in their main characters with *Manacus manacus purus* but form the connecting link with *Manacus manacus manacus* by the slight grayish admixture of the under tail coverts.

²Specimens recorded by Miss Snethlage ('Cat. Aves Amaz.', p. 370, 1914), from Boim, the left bank of the Tapajoz, must be examined before ascertaining to which race they are referable. Specimens from Pebas, Iquitos (Peru), belong to *Manacus manacus interior* Chapman.

***Nystalus maculatus pallidigula*, new subspecies**

SUBSPECIFIC CHARACTERS.—Agreeing with *Nystalus maculatus parvirostris* from Goyaz, in shortness of bill and tail, but differing in the considerably paler deep buff, instead of tawny color, of the throat and in having the breast and sides marked with longitudinal stripes instead of rounded "rhomboid" spots.

TYPE.—No. 127477, Amer. Mus. Nat. Hist.; ♂ ad.; Urucum, near Corumbá, Matto Grosso, Brazil; December 8, 1913; George K. Cherrie. Wing, 78.5; tail, 70; exposed culmen, 29.5; culmen from nostril, 24.

SPECIMENS EXAMINED

Nystalus maculatus pallidigula.—BRAZIL: Matto Grosso,—Chapada, 2 ♂, Urucum, 4 ♂, 3 ♀, Retiro, 2 ♂, Caiçara, 1 ♂.

Nystalus maculatus maculatus.—BRAZIL: Ceará,—Quixada, 2 ♂, 3 ♀, Jua, 2 ♂ (the type, Field Museum), 3 ♀; Bahia,—(trade skins), 18?, Lamarão, 3 ♂, Fazenda Taboa, Rio Preto, 1 ♀, Joazeiro, 1 ♂, S. Amaro, 1 ♂, 2 ♀, Alagohinas, 1 ♀, Mata de S. Joan, 1 ♀; Piahy,—Therezina, 1 ♂; Pernambuco,—Recife, 1 ♀; Maranhão,—1 ♀, Miritiba, 1 ♂, 3 ♀; Marajó Island,—Pacoval, 2 ♀; Santarem, 11 ♂, 9 ♀, 2 ad ♀; Rio de Janeiro, 1 ♀.

Nystalus maculatus parvirostris.—BRAZIL: Goyaz,—Rio Araguaya, 2 ♂ (the type, Tring Museum), 2 ♀.

Nystalus maculatus striatipectus.—BOLIVIA: Dept. Mizque,—S. José, 1 ♀; Dept. Santa Cruz,—Valle Grande, 1 ♀, Samaipata, 1 ♀, Pampa de la Isla, 1 ♂, Santa Cruz de la Sierra, 2 ♂, Pampas de Taperas (20 leagues south of Santa Cruz), 1 ♀; Prov. del Sara,—1 ♂; Chiquitos,—Palmarito (Rio S. Julian), 2 ♀; Dept. de la Cordillero,—Guanacos, 1 ♀; Dept. Tarija,—Villa Montes (Pilecmayo River), 3 ♂; neither locality nor sex given, 2; Puerto Suarez, 1 ♂. ARGENTINA: Prov. of Jujuy,—Perico, 1 ♂, 1 ♀; Prov. of Salta,—Embarcacion, 2 ♂, 6 ♀, Rosario de Lerma, 7 ♂, 4 ♀; Prov. Tucuman,—Sarmiento, 2 ♂; Prov. Santiago del Estero,—Suncho Corral, 1 ♂, 3 ♀; Prov. de Chaco,—Avia Terai (General Pinedo), 1 ♂, 1 ♀.

Nystalus maculatus pallidigula agrees with *Nystalus maculatus striatipectus* from Bolivia and northwest Argentina in the pale color of the throat, and the markings of the lower parts, but is much smaller, the bill especially being weaker. The range of this subspecies is confined to Matto Grosso.

None of the characters claimed by Mr. Cory for his proposed new race of *Nystalus maculatus nuchalis*¹ hold good. There is perhaps a slight difference in the coloration of the under parts, the birds from Ceará being, as a rule, less heavily spotted beneath. This, however, may be due in part at least to the make-up of the skins, and is not borne out by the other specimens from northeast Brazil we have seen, since examples from Miritiba, Maranhão and the neighboring states of Piahy are not distinguishable from the average Bahia birds.

MEASUREMENTS (Extremes and Averages)

	Wing	Tail	Exposed Culmen	Collection
<i>Manacus manacus subpurus</i>				
Brazil: Matto Grosso	3 ♂ 49. -51. (49.8)	30.5-31.5 (30.8)	9. -10.5 (9.6)	1 Vienna Museum
" Borba, Rio Madeira	3 ♂ 49. -50. (49.1)	29. -31.5 (30.)	8.5-10. (9.1)	
<i>Manacus manacus purus</i>				
Brazil: Santarem	6 ♂ 47. -52. (49.5)	29. -31. (30.)	8.5-10. (8.9)	Amer. Mus. Nat. Hist.
" Providencia	1 ♂ 49.	29.	8.5	" "
" Baião, Rio Tocantins	1 ♂ 51.	32.	9.5	" "
" "	1 ♂ 49.	30.	8.5	" "
" Diamantina, near Santarem	1 ♂ 48.	30.5	9.5	" "

¹² ♂ from the Amer. Mus. Nat. Hist., 1 ♂ from the Vienna Museum.

Nystalus maculatus maculatus inhabits northeastern Brazil from Bahia to Ceará, Maranhão, and occurs also on the Island of Marajó and at Santarem.

Nystalus maculatus parvirostris is as yet only known from the Upper Rio Araguaya, near Leopoldina in the state of Goyaz.

Nystalus maculatus pallidigula is confined to west and east Matto Grosso.

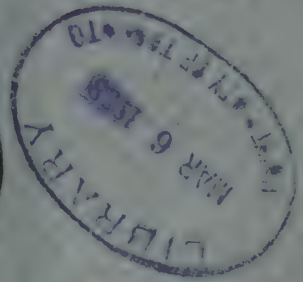
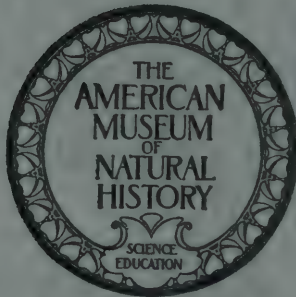
Nystalus maculatus striatipectus ranges over eastern Bolivia and northwest Argentina. -

AMERICAN MUSEUM NOVITATES

No. 59

TWO NEW SPECIES OF WEST INDIAN CLERIDÆ (COLEOPTERA)

By A. B. WOLCOTT



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TWO NEW SPECIES OF WEST INDIAN CLERIDÆ
(COLEOPTERA)

BY A. B. WOLCOTT

Field Museum of Natural History, Chicago, Ill.

Through the kindness of The American Museum of Natural History, the writer has had the privilege of examining and describing the following interesting, new clerids.

***Callotillus crusoe*, new species**

Figure 1

Moderately slender; black. Dorsal surface rather feebly shining; ventral surface very shining; front of head narrowly rutilous; antennæ (apical two segments black) and labrum at sides testaceous; elytra black, apical half in large part pale yellow, a large, ovate, ante-apical, common maculation, black, sides at middle with an oblique, elevated, white maculation, a similar minute, slightly transverse maculation at basal fourth at middle of width of each elytron.

Head, including the not prominent eyes, equal in width to pronotum at apex; surface rather coarsely rugoso-punctate; pubescence dense, semirecumbent, grayish white. Antennæ slightly longer than head and prothorax, ten-segmented; basal segment short, very stout; second small, subtriangular; third to ninth triangular, their apices acute; ninth and tenth forming an elongate ovate mass; tenth narrower than eighth, nearly as long as seventh and eighth together; color testaceous; ninth and tenth segments black, the former narrowly testaceous at base.

Pronotum slightly longer than wide; apical margin truncate; sides parallel to slightly behind the middle, then rather strongly arcuately narrowing to about basal fourth, thence subparallel to base; base truncate, the extreme edge with a fine elevated margin; subapical constriction wanting; subapical transverse impression nearly obsolete, only faintly indicated in certain lights; surface with sculpture same as that of head; pubescence same as that of head but with long, sparse, erect, black hairs intermixed. Elytra at base nearly twice as wide as pronotum at base; length two and one-third times width at base; humeri obtusely rounded; sides from humeri to middle straight, nearly parallel, behind the middle gradually broadening to apical fourth, thence arcuately narrowing to the conjointly rounded apices; color black, apical half pale yellow, anterior margin of yellow portion convex; in apical third a large, elongate ovate, common, sutural maculation, extending very nearly to apical margin, black; sides slightly anterior to middle with a feebly arcuate, linear, elevated, white maculation, this extending obliquely and attenuately forward from lateral margin halfway to suture; at basal fourth a minute, slightly transverse, elevated, white maculation midway between the lateral margin and the suture; base with a broad triangular area having one angle on suture, and an oblique fascia each side,

extending from immediately behind the humeri to the suture at a point slightly before the middle, composed of dense, coarse, grayish-white pubescence; a large, feebly elevated, subbasal tubercle, midway between lateral margin and suture, densely clothed with a tuft of long, black hairs; black portions densely clothed with short, semirecumbent, black pubescence, longer and erect in humeral region; the yellow portion densely clothed with pale yellowish pubescence, a few nearly erect, long, black hairs intermixed; surface finely and sparsely punctate at extreme base, becoming closer at about basal fourth, and a little coarser toward the apex, punctuation irregular throughout, showing no tendency to become seriate. Abdomen impunctate, very sparsely clothed with long, black hairs. Mesosternum smooth, moderately clothed with semirecumbent, grayish-white pubescence. Legs rather short and stout, moderately clothed with rather long, white hairs. Length, 4.2 mm.

HOLOTYPE.—A male, No. 26991, Camuy, Porto Rico, August 8, 1922 (G. N. Wolcott, collector and donor), in the collection of The American Museum of Natural History.



Fig. 1. *Callotillus crusoe*, new species.

Fig. 2. *Corinthiscus arinoides*, new species.

C. crusoe is allied to *C. elegans* Erichson (*occidentalis* Gorham), but differs from that species, as well as from *C. vafer* Wolcott, by the entire absence of seriate elytral punctures, its somewhat larger size, its rather broader form, and the impunctate metasternum and abdomen. The differently formed and arranged raised fasciæ or maculations are also distinguishing characters. The head and pronotum in *C. crusoe* are densely pubescent, sparsely so in the other species; the antennæ are differently formed, having a greater number of triangular segments; the color pattern is unique, the arrangement of the pubescence in basal half of elytra is distinctive, and the densely pilose elytral tubercles are elsewhere known only in *C. eburneocinctus* Wolcott.

This species is the first member of the family to be recorded from Porto Rico, and the first *Callotillus* known from any of the West Indian islands.

C. crusoe, as well as *elegans* and *vafer*, is placed in *Callotillus* provisionally only, as it differs from the other members of the genus in several important characters. No doubt, eventually the creation of a new genus will be necessary for the reception of this new species and *C. elegans* and *C. vafer*. In *C. eburneocinctus*, the genoholotype, the terminal segment of the maxillary palpi is subcylindrical, the eyes are emarginate internally and the abdomen has but five visible segments. In *elegans*, *vafer*, and *crusoe* the maxillary palpi have the terminal segment conical, the eyes are deeply emarginate anteriorly, and the abdomen has six distinct well-developed segments.

Corinthiscus axinoides, new species

Figure 2

Elongate; black, feebly shining, clothed throughout with grayish pubescence; palpi, antennæ, legs (the knees black), elytra (a common scutellar maculation, the flanks in anterior half, a small fleck before the middle, and a large irregular lateral maculation at apical fourth, black) and abdomen (three basal segments broadly infusate at middle) ferruginous.

Head, including the eyes, subequal in width to pronotum at apex; black; surface coarsely, densely rugosely punctate; pubescence rather sparse, recumbent and erect, grayish white. Antennæ extending but slightly beyond base of elytra, eleven-segmented; segments one to five and nine, ten and eleven (the mass) longer than wide; segments six, seven and eight shorter, their width subequal to their length; basal segment rather stout, moderately long; second and fourth subequal in width and length; third one-third longer than second; fifth segment equal in length but slightly broader than the fourth; ninth and tenth segments much larger, width subequal to length, depressed, subtriangular and rather deeply emarginate at apex, thus producing a short, stout ramus at apical angle on anterior margin; eleventh one-third longer than tenth, depressed, gradually broader from base to the obliquely subtruncate apex, broadly infusate in about middle third; pubescence similar to that of head.

Pronotum black, slightly wider than long; surface sculpture same as that of head but much coarser; disk at middle with a large, slightly longitudinal, moderately deep depression; anterior to the depression a very fine, longitudinal carina extends nearly to apical margin; posterior to the depression a rather broad, nearly smooth, slightly elevated area extends nearly to base; pubescence same as that of head; apical margin arcuate; sides rather strongly constricted near apex, thence nearly straight and strongly divergent to basal third, in basal third strongly obliquely narrowed to base; base very slightly narrower than apex, subtruncate, scarcely perceptibly bisinuate, finely margined. Scutellum subtriangular, at middle longitudinally sulcate, black. Elytra at base slightly wider than prothorax at its widest part; length two and two-thirds times width at base; humeri obtuse; sides straight, parallel from humeri to about apical third, thence rather rapidly, arcuately narrowed to the con-

jointly rounded apices; flanks declivo-subinflexed, with lateral stripe not visible from above; surface very coarsely punctate; punctures cribrate, very irregularly arranged in series, those bordering the suture reaching to about the middle, those on the flanks and those upon the disk extending nearly to apex, and only slightly reduced in size but more feebly impressed; punctuation of extreme apical portion coarse, irregular, not deeply impressed; intervals throughout rather finely, irregularly punctate; pubescence uniformly distributed, moderately dense, especially at apex, semierect, grayish white; color ferruginous; lateral margin from base nearly to middle rather broadly, and five maculations, piceous; first maculation common, of moderate size, surrounding the scutellum; second antemedian, small, irregularly rounded, nearer to suture than to flanks; third, at apical fourth, formed of a broad, longitudinal, marginal marking broadly coalescent with an irregularly rounded, discal maculation, the maculation as a whole reaching from the lateral margin two-thirds distance to suture. Metasternum rather coarsely and densely rugoso-punctate, its side pieces more finely punctate and obliquely strigose; pubescence sparse. Abdomen moderately coarsely, closely, rugoso-punctate, the posterior margin of three basal segments nearly smooth; sixth ventral semicircular; pubescence rather short, dense, recumbent, grayish white. Legs pale ferruginous, the knees black; pubescence moderately sparse; tibiae of anterior legs with outer margin in basal half irregular, in apical half closely, irregularly denticulate, the outer apical angle with a moderately large, strong tooth; tarsi with three basal segments nearly nude beneath. Length, 20.5 mm.

HOLOTYPE.—A male (?), No. 26992, San Carlos Estate, Rio Seco, Guantanamo, Cuba, July 4, 1915 (C. T. Ramsden, collector and donor), in the collection of The American Museum of Natural History.

This species, the largest *Pelonia* known to the writer and believed to exceed in size any other described species, remarkably resembles the Peruvian *C. riveti* Lesne in most details of structure and, to a considerable extent, in the coloration. It is, however, of much greater size (*riveti*, 6-8 mm.); the pronotum is proportionally broader, with its sides more strongly divergent, not from the apical margin but from the subapical constriction; the pronotal discal depression does not exceed in extent one-third the total length of the pronotum (entire in *riveti*); the rows of elytral punctures are longer and much more irregular and confused; the intervals punctate (smooth and shining in *riveti*); the tibiae of the anterior legs have their outer margin distinctly denticulate in apical half (simple in *riveti*); and the tarsi have the three basal segments nearly nude beneath (densely and very finely villose in *riveti*).

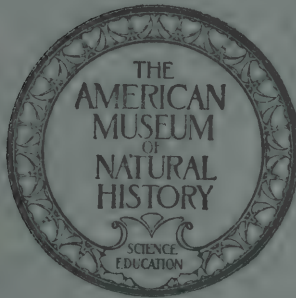
In the new species the system of coloration is much the same as in *C. riveti*, the principal difference being that in *riveti* the stripe bordering the lateral margin in basal half of the elytra is wanting, but the shoulders are marked with a piceous maculation, of which there is only the slightest trace in *axinoides*; and the post-median maculation is common, fascia-like, but irregular in outline and fails to reach the lateral margin of the elytra.

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NOTES ON WEST INDIAN LYCIDÆ AND LAMPYRIDÆ (COLEOPTERA), WITH DESCRIPTIONS OF NEW FORMS

By ANDREW J. MUTCHLER



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NOTES ON WEST INDIAN LYCIDÆ AND LAMPYRIDÆ (COLEOPTERA), WITH DESCRIPTIONS OF NEW FORMS

BY ANDREW J. MUTCHLER

INTRODUCTION

In a recent paper (1922, Bull. Amer. Mus. Nat. Hist., XLVI, pp. 413-490) Mr. Leng and I gave a treatise on the then known species of Lycidæ, Lampyridæ, and Cantharidæ of the West Indies. We described thirty-five new species and three new varieties, making a total of one hundred and ten species and seven varieties treated. Since that time I have had the privilege of examining a number of West Indian species belonging to these families, among them some species which I believe to be new, and several which offer locality records not heretofore recorded.

The specimens were received from several different sources: British Museum, sent by Mr. G. J. Arrow; Mr. Geo. N. Wolcott of the Insular Experiment Station at Rio Piedras, Porto Rico; University of Iowa, sent by Dr. Dayton Stoner; Estacion Experimental Agronomica, Santiago de las Vegas, Cuba, sent by Mr. Stephen C. Bruner, Chief of the Department of Entomology and Vegetable Pathology; and a number from Haiti, collected by Mr. F. E. Watson of this Museum, whose expedition to that part of Hispaniola was made possible through the generosity of Mr. B. Preston Clark.

The locality records for the specimens collected in Haiti by Mr. Watson are in many cases accompanied by field notes. There are also some records which refer to small, somewhat obscure, places not indicated on most maps of the Haitian Republic. The following is a list of these localities with the field notes.

PORT AU PRINCE. Material taken near Hotel Montagne, about two miles southeast of center of town. Altitude about 250 to 350 feet.

CARREFOUR. On the south coast of Port au Prince Bay, about seven miles west of the city of Port au Prince.

PETIONVILLE. About seven miles southeast of Port au Prince and located in the hills at about 1400 feet altitude.

MANVILLE. At the western end of Lake Assuëi (called Assuëi or Etang Sau-matre). The present termination of the railroad running east from Port au Prince. Altitude about 60 feet.

FOND PARISIEN. On the south shore of Lake Assuéli, about ten miles on a straight line (across the lake) southeast of Manville. Collecting done in the plantations back from the beach. This region would be arid except for irrigation. Altitude about 60 feet.

LA MORINIÈRE. Along the railroad about thirteen miles east of Port au Prince. Altitude about 125 feet.

PONT BEUDET. One station west of La Morinière, or about eleven miles east of Port au Prince. Altitude about 100 feet.

AUX CAYES. (On some maps as Cayes). Fort Ilet district along the coast to about one and one-half miles east of the town and in plantations a short distance back from the coast. This region is studded with lagoons and marshes. Collecting also done about one and one-half miles west of the town to the River La Ravine.

CHARPENTIER. About three to five miles north of Aux Cayes, approximately at sea-level.

SUPPLICE. On St. Marc Bay, about two miles south of St. Marc.

PIVERT. About two and one-half miles inland east of St. Marc. Altitude 100 to 400 feet.

In the following records and descriptions, which include the Lycidæ and Lampyridæ, exclusive of the genera *Photinus*¹ and *Photuris*, I have arranged the genera in the same order as in the recent paper by Mr. Leng and myself on these families, and have also, where known, given the collector's name (in parenthesis) after the locality records and indicated the collections in which the various specimens are located.

LYCIDÆ

Thonalmus dominicensis (Chevrolat)

HAÏTI: Aux Cayes, March 15-18 (F. E. Watson); Coll. Amer. Mus. Nat. Hist.

Thonalmus chevrolati (Bourgeois)

HAÏTI: La Morinière, March 1-5; Aux Cayes, March 15-18; Charpentier, March 19; Pivert, April 1 (F. E. Watson); Coll. Amer. Mus. Nat. Hist. I have also seen specimens from Haina, DOMINICAN REPUBLIC, in the collection of Geo. N. Wolecott.

Thonalmus suavis (Jacquelin Duval)

CUBA: Santiago de las Vegas, December 23 (J. Acuna); Coll. Amer. Mus. Nat. Hist.

Thonalmus amabilis (Jacquelin Duval)

CUBA: Taco Taco, April 1-6 (S. C. Bruner, J. Acuna, and C. H. Ballou); Nagua Oriente, July 7, 1922 (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist.

Thonalmus aulicus (Jacquelin Duval)

CUBA: Nagua Oriente, July 7 (S. C. Bruner, and C. H. Ballou); Coll. Amer. Mus. Nat. Hist.

¹There are, among the material received from the various sources spoken of in the introduction of this paper, several records of Lampyridæ belonging to the genera *Photinus* and *Photuris* and some species of Cantharidæ. I hope to publish these in the near future.

Thonalmus aulicus variety **distinguendus** (Jacquelin Duval)

CUBA: Taco Taco, April 1-6 (S. C. Bruner, J. Acuna, and C. H. Ballou); Santiago de las Vegas, April 28 (S. C. Bruner); Coll. Amer. Mus. Nat. Hist.

LAMPYRIDÆ**Alecton discoidalis** Castelnau

CUBA: Santiago de las Vegas (B. T. Barreto); Coll. Amer. Mus. Nat. Hist. Santiago de las Vegas (M. Plasencia and J. Acuna); Coll. Estacion Exp. Agronomica, Cuba.

Alecton flavum Leng and Mutchler

CUBA: Taco Taco, April 1-6 (S. C. Bruner, J. Acuna, and C. H. Ballou); Coll. Amer. Mus. Nat. Hist.

LUCIDOTA Castelnau

Among the material sent to this Museum by Mr. Stephen C. Bruner are several specimens which represent three new species. I have placed them in this genus as they have the strongly compressed serrate (especially in the male) antennæ. One of the species has the antennæ of the male a little longer than the body; in another the male antennæ are just about the length of the body; while in the third species the male antennæ are somewhat shorter. I am also describing as new one other species and a variety represented by specimens in the National Museum Collection, which Mr. Leng and I failed to describe in our paper on the species. In general outline the species which have been placed in this genus come close to *Photinus*, but can be separated from that genus by their serrate antennæ. In this connection it may be well to quote a translation of one of Ernest Olivier's remarks on the subject: "Some *Photinus* with compressed antennæ come close to this genus but one must note that in these the joints of the antennæ are merely depressed without being dentate or triangularly broadened."

The West Indian representatives of *Lucidota* could be separated into groups, based on the relative length and more or less strong serration of the male antennæ. These characters do not hold good for the females as, in all of the specimens of this sex which I have examined, the female antennæ are approximately of the same length and the serration does not show any marked difference between the species. I have, therefore, in the following key, avoided using the male antennal character, except for species which could not otherwise be very clearly separated.

Of the species here discussed from the West Indies two are found in Porto Rico, one in Dominica, while all of the others are confined to Cuba. The species found in Porto Rico and Dominica are so noted in the key.

- 1.—Disk of pronotum yellow, without rosy color 2.
 Disk of pronotum more or less red (rosy), with or without black or dark markings 3.
- 2.—Pronotum darker at the apex; small species, less than 5 mm. in length.
 fulvotinctus.
 Pronotum wholly yellow, larger, 6.5 mm. in length *fulvotinctus* var. *flavicollis*.
- 3.—Pronotum with a well-defined black mark on middle of the disk 4.
 Pronotum not generally marked with darker color, but if marked with darker color, then with a black or brownish spot at apex or an ill-defined dark cloud on the central portion of disk 7.
- 4.—Elytra black or brownish black, not margined with paler color (Dominica).
 incognita.
 Elytra margined with paler color 5.
- 5.—Discal black markings on the pronotum broad and of approximately the same width throughout; antennæ of male somewhat strongly serrate and about two-thirds the length of the body (Porto Rico) *marginipennis*.
- 6.—Sutural and lateral pale margins of the elytra more or less disconnected at the apex, leaving the apical margins dark; antennæ of male strongly serrate and about as long as the body; pygidium of male narrowly rounded at apex.
 bruneri.
 Pale margins of the elytra continuous around the apex; antennæ of male more moderately serrate and about one-half the length of body; pygidium of male squarely truncate at apex *subdubitata*.
- 7.—Pronotum with a dark spot at the apex; scutellum pale yellow; antennæ of male very strongly serrate and somewhat (at least the length of the apical joint) longer than the body *chevolati*.
 Pronotum generally without dark marking at apex; antennæ of male not longer than the body 8.
- 8.—Scutellum pale to dark brown; sutural and lateral pale markings of the elytra more or less disconnected at the apex, leaving the apical margin dark or very narrowly pale, and sometimes with the sutural margin dark; antennæ of male moderately strongly serrate and not quite as long as the body.
 miniatocollis.
 Sutural and lateral margins of the elytra continued more or less broadly around the apex; antennæ of male somewhat strongly serrate and about as long as the body (Porto Rico) *decorus*.

***Lucidota fulvotinctus*, new species**

MALE.—Pale brown. Head pale to dark brown, palpi brown, mandibles paler. Antennæ about two-thirds the length of the body, serrate from the third joint, all of the joints dark brown. Pronotum yellow on the disk, brownish at apex, submargins and apex somewhat coarsely with disk less coarsely punctate; disk with a median channel extending from the base to the middle. Scutellum brownish yellow. Elytra pale brown, margined at the sides and suture with paler color, apex not completely margined, pubescence short, yellow. Underside pale brown with a darker brown mark on the sides which extends from the prosternum and covers the metasternum, then

extends along the ventral segments, leaving the lateral margin and central portion pale brown to the seventh segment, this and the eighth segment wholly pale yellowish brown. Legs brown, femora slightly darker. Length, 4-4.5 mm.

FEMALE.—Unknown.

Described from two male specimens collected by E. A. Schwarz at Cayamas, CUBA, May 18 and 31.

Holotype: Coll. U. S. Nat. Mus. Paratype: No. 26962; Coll. Amer. Mus. Nat. Hist.

***Lucidota fulvotinctus* variety *flavicollis*, new variety**

MALE.—Pale brown. Head yellow, slightly infusate at the front, palpi and mandibles yellow, the latter brown at apex. Antennæ about two-thirds the length of body, serrate from third joint, first to third joints more or less pale beneath. Pronotum yellow, apex and sides somewhat coarsely with disk less coarsely punctured; disk with a median channel extending from the base to about the middle. Scutellum yellow. Elytra pale brown, margined, except at base, with yellow, covered with a short yellow pubescence. Underside and legs, pale yellow. Length, 6.5 mm.

FEMALE.—Unknown.

Holotype: Baracoa, CUBA; September; Aug. Busek, Collector; Coll. U. S. Nat. Mus.

The above species and variety are represented by specimens which Mr. Leng and I set aside when studying the West Indian Lampyridæ, but my further study has convinced me that they represent a species unlike anything previously described. They have the elytra light brown in color, with the thorax yellow, differing in this respect from other West Indian species of the genus which have the elytra dark brown or black and the thorax more or less tinged with rosy red.

The specimens from which the species were described were examined by the late Ernest Olivier and returned to the U. S. National Museum without a name.

***Lucidota miniatocollis* Chevrolat**

There are thirteen specimens in the material we received from Mr. S. C. Bruner which are smaller (5-6 mm. in length) than the specimens Mr. Leng and I considered as belonging to *miniatocollis*, but otherwise they agree with the description which we gave of the species. They are from CUBA: Nagua Oriente, July 7; Sierra Maestra, July 10-20; and Taco Taco, April 1-6; (S. C. Bruner, J. Acuna, and C. H. Ballou); Coll. Amer. Mus. Nat. Hist.; Nagua Oriente, July 7 (S. C. Bruner and C. H. Ballou); Taco Taco, April 1-6 (S. C. Bruner, J. Acuna, and C. H. Ballou); Los Sibalos, Ciénaga de Zapata, July 19, on *Chrysobalanus icaco*; Coll. Estacion Exp. Agronomica, Cuba.

***Lucidota subdubitata*, new species**

MALE.—Elongate, brownish black. Head black on the occiput, labrum and space between the antennae paler. Mandibles pale brown, darker at the tips. Palpi brown, apical joint black. Antennae black, pubescent, slightly more than one-half the length of the body, serrate from the third joint. Pronotum somewhat narrowly rounded at apex, hind angles slightly acute, margins pale yellow, somewhat translucent, subapical margin black; disk rosy with a more or less noticeable median channel and with a median black marking which extends narrowly, for a short distance, along the basal margin and is more or less narrowed basally, becoming broader apically and fusing with the broad apical spot. Elytra black, margined except at base with yellow, pubescence yellowish. Pygidium dark at base paler apically, somewhat broadly and squarely truncate at apex. Prosternum rosy, this color extending more or less into the apex of the mesosternum which is otherwise black. Ventral segments of the abdomen dark, last two segments somewhat paler in one specimen. Legs piccous, femora somewhat paler. Length, 8.5 to 11.5 mm.

FEMALE.—Similar in color and markings to the male. Head between the eyes not as pale. Antennae shorter, less serrate. Pygidium black triangular, narrowed at apex. Femora in one specimen paler on the inner side and basally. Last ventral segment of the abdomen slightly paler and with light organs at each side of the base. Length, 10.5 to 13 mm.

CUBA.—Holotype male, No. 26964, and allotype female, No. 26965, summit¹ of Pico Turquino, July 22, 1922. Paratype female, No. 26966, Sierra Maestra, July 10–20, 1922. Paratype male, No. 26967, summit of Pico Turquino, July 22, 1922 (C. H. Ballou and S. C. Bruner); Coll. Amer. Mus. Nat. Hist. Paratypes, female, Pico Turquino, July 20 and 22; alt. 5500 to 6000 feet and summit (S. C. Bruner and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

***Lucidota bruneri*, new species**

MALE.—Elongate, blackish brown. Head black, pink around the antennal sclerite, (possibly deciduous). Mandibles dark at tip. Palpi dark brown, somewhat thickly covered with yellowish pubescence. Antennae dark brown, approximately as long as the body, strongly serrate from the third joint, covered with short, stiff, brown hairs. Pronotum somewhat broadly rounded at apex, hind angles straight; side margins pale, somewhat translucent, apical margin with a dark spot, basal margin rosy at the central portion, side, apical and basal margins with somewhat coarse punctures, disk rosy, somewhat obsoletely channeled, finely punctate and with a black central marking which extends narrowly from the base and joins with the broad apical spot; in one specimen the basal part of the discal black mark is almost entirely obliterated leaving only a small dark spot at the base and becoming dark again at about the middle. Scutellum dark brown. Elytra brownish black, margined at the suture and sides with pale yellow, apical margins darker; closely punctate and covered with a very short brown pubescence. Pygidium rounded at apex, pale yellow, slightly darker basally. Underside dark brown. Prosternum and middle

¹There are several specimens among the material sent by Mr. S. C. Bruner which are marked "Cumbre" (Summit) when referring to altitude. All specimens so marked are from Pico Turquino, the summit of which, according to published records, is approximately 2400 meters (about 7800 feet) above sea level.

of apex of mesosternum extending into the coxal cavities rosy, other parts of mesosternum and ventral abdominal segments, except the last two, dark brown, last two (including the eighth) segments pale yellow. Legs dark brown. Length, 12 mm.

FEMALE.—Unknown.

CUBA.—Holotype, No. 26963, summit of Pico Turquino, July 22, 1922 (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist. Three paratypes near Pico Turquino, July 20, alt. 4500 to 5000 feet and Pico Turquino, July 22, alt. 4500 to 5500 feet and summit (S. C. Bruner and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

This species and *subdubitata* are somewhat similar in size and color markings but the males can readily be separated on the following characters. In *subdubitata* the antennæ are much shorter than the body; the basal angles of the thorax are slightly acute and the discal dark marking in all the specimens I have seen extends narrowly for a short distance along the basal margin; the apical margins of the elytra are not clouded with darker color but are as pale as the sutural and lateral margins and the pygidium is dark and squarely truncate at the apex.

***Lucidota chevrolati*, new species**

MALE.—Elongate. Front of head, antennæ, and palpi black. Antennæ much flattened, strongly serrate from the third joint, longer than the body by more than the length of the last joint. Pronotum rosy on the disk, side margins yellow, apex with a fuscous spot, disk with a short, shallow impression. Scutellum yellow, rosy at the base. Elytra black, margined at the sides and suture with pale yellow, extreme apical margins dark; punctate and covered with a short, pale brown pubescence. Underside of thorax pale yellow with rosy tint. Meso- and metasternum pale yellow with side pieces of both and central portion of metasternum dark. First to sixth ventral segments whitish yellow at the sides and middle, broadly brown at the sublateral margins, seventh segment pale whitish yellow, eighth pale brown. Legs pale brown, with inner side of femora paler. Length, 6.5 to 7.5 mm.

FEMALE.—Unknown.

CUBA.—Holotype, No. 26968, and paratype, No. 26969, Sierra Maestra, July 10–20, 1922, alt. 2000 to 3000 feet (C. H. Ballou and S. C. Bruner); Coll. Amer. Mus. Nat. Hist. Two paratypes, Sierra Maestra July 10–20, 1922, alt. 2000 to 3000 feet (C. H. Ballou and S. C. Bruner); Coll. Estacion Exp. Agronomica, Cuba.

The males of this species and *bruneri* have the antennæ longer and more strongly serrate than any of the other West Indian species of the genus. The two species may be readily separated on their relative size, also *bruneri* has the central portion of the disk of the pronotum more or less marked with darker color; the scutellum dark brown and the ventral surface of the body darker colored.

I have been informed by letter from Mr. Stephen C. Bruner, from whom the specimens which I have described as *chevrolati* were received, that there are in the Gundlach collection at Havana specimens which

may be representatives of this species. These specimens bear the specific name *virilis*. I can find no description of any such species and, therefore, believe *virilis* to be a manuscript name.

***Callopisma monticola*, new species**

MALE.—Elongate oval, reddish yellow, front of head, antennæ, palpi, apical two-thirds of the elytra, tibiæ, tarsi and protruding parts of dorsal segments, except pygidium, black or dark brown. Head prolonged and narrowed in front. Mandibles reddish yellow, slightly darker at tips. Palpi large, four jointed. Antennæ compressed and moderately serrate from the third joint, about one-half the length of the body. Pronotum wider than long, apical and lateral margins broadly turned up, somewhat translucent and coarsely punctured, disk yellow with (in one specimen) a small black spot on the middle of the basal half, central portion with a short, narrow impressed line. Elytra with about basal third reddish yellow; somewhat finely and closely punctate, pubescent. Pygidium bisinuate truncate, the middle lobe being much shorter than the lateral ones. Legs compressed. Length, 11 to 11.5 mm.

FEMALE.—Unknown.

CUBA.—Holotype, No. 26970, and paratype, No. 26971, Pico Turquino, July 20, 1922, alt. 5000 to 5500 feet (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist. Four paratypes, Pico Turquino, July 20, 1922, alt. 4500 to 5500 feet (S. C. Bruner and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

This species is similar in color and length to *borencea*, but *monticola* is much broader, the thorax is more broadly rounded at the apex, the apical black color of the elytra does not end in as straight a line but is irregularly indented where it meets the yellow color, and the dorsal abdominal segments which protrude beyond the ventral ones are black. These segments do not protrude as far and are of the same color as the ventral ones in *borencea*.

***Callopisma maestra*, new species**

MALE.—Elongate oval. Antennæ black, approximately two-thirds as long as the body in the holotype, but in the seventeen specimens examined the antennæ vary in length from only slightly more than one-half the length of the body to at least as long as the whole insect; third and following joints compressed, feebly serrate, densely pubescent. Head prolonged and narrowed in front, ranging in color from dark brown to yellow. Palpi dark, four jointed. Pronotum orange-yellow, about twice as broad at base as long, margins turned up, disk with a somewhat narrow median channel extending from the sub-basal margin to the middle. Elytra yellow at basal part, apical part extending beyond the half, and in one specimen to the basal third black; pubescence short; disk with three costæ, two on the upper portion and one on the sublateral margin, one or more of these costæ very vaguely outlined in some specimens. Pygidium bisinuate emarginate. Underside yellow. Femora yellow, darker at extreme base. Tibiæ and tarsi dark brown. Length, 7 to 8.5 mm.

FEMALE.—Unknown.

CUBA.—Holotype, No. 26972, and six paratypes, No. 26973, Sierra Maestra, alt. 4000 to 5000 feet, July 10–20, 1922; one paratype, No. 26974, Pico Turquino, alt. 4500 to 5000 feet (C. H. Ballou and S. C. Bruner); Coll. Amer. Mus. Nat. Hist. Five paratypes, Sierra Maestra, July 10–20, 1922, alt. 3000 to 4000 feet; Pico Turquino, July 20, 1922, alt. 3000 to 5000 feet (S. C. Bruner and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

This species somewhat resembles *emarginata* in color-markings, but *maestra* is less broadly oval. The antennæ are generally longer; the disk of the thorax is yellow without rosy hue, and the apical black portion of the elytra extends farther toward the base. The differences in the antennal length, which result from a proportionate lengthening or shortening of each joint, are the most remarkable variations observed in my study of the West Indian Lampyridæ.

There is also, among the seventeen examined, one specimen which has the left antenna distorted in such a manner that the apex of the eighth and base of the ninth joint are unusually broadened and from the apex of the eighth and attached to the inner basal part of the ninth joint is a one-jointed projection which resembles an apical antennal joint. This projection is about twice the length of the ninth joint. The left antenna is also somewhat shorter than the right one.

***Callopisma postica* (E. Olivier)**

HAITI.—Pont Beudet, March 3–4 (F. E. Watson); Coll. Amer. Mus. Nat. Hist. ST. DOMINGO.—No definite locality; Coll. British Museum.

***Callopisma borencona* Leng and Mutchler**

PORTO RICO.—No definite locality, Coll. British Museum; Vega Alta, January 7 (R. T. Cotton); Larres, June 14 (Geo. N. Wolcott); Coll. Insular Exp. Sta. Porto Rico.

***Callopisma adjuncta* (E. Olivier)**

CUBA.—Palma Mocha, Sierra Maestra, July 10–20, alt. 3500 to 4370 feet (C. H. Ballou and S. C. Bruner); Coll. Estacion Exp. Agronomica, Cuba.

***Callopisma fuscoterminalis*, new species**

MALE.—Elongate oval, reddish yellow. Front of head flat, pubescent. Mandibles darker at apex. Antennæ black, first joint slightly paler basally; moderately serrate from third joint on. Pronotum moderately narrowly rounded at apex, basal angles acute, disk with a short, shallow, longitudinal impression at basal center; submargins somewhat coarsely punctate, disk more finely punctate; pubescence sparse. Elytra reddish yellow for about the basal two-thirds, apical third black, the two colors joining in a somewhat straight line; discal costæ more or less obscure; moderately finely punctate and covered with a short pubescence. Underside reddish yellow. Femora and tibiæ reddish yellow. Tarsal joints black at apex, claw joint reddish yellow. Length, 7.5 mm.

FEMALE.—Unknown.

CUBA.—Holotype, No. 26975, Taco Taco, April 1-6, 1922 (S. C. Bruner, J. Acuna and C. H. Ballou); Coll. Amer. Mus. Nat. Hist.

This species comes close to *postica* in color, but the insect is broader throughout. The thorax is more broadly rounded at the apex and the basal angles are more acute.

It should be placed in the key to species of *Callopisma* (Leng and Mutchler, 1922, Bull. Amer. Mus. Nat. Hist., XLVI, p. 439) in the section with *ramsdeni*, but can be separated from that species by the color of the legs, etc. The tibiae are pale in this species and black in *ramsdeni*. It is also not as broad as *ramsdeni* but rather intermediate in that respect between *ramsdeni* and *postica*.

***Callopisma ramsdeni* Leng and Mutchler**

CUBA.—Near Nagua Oriente, July 7, alt. 700 to 900 feet (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist. and Coll. Estacion Exp. Agronomica, Cuba.

***Callopisma bellicosa* (E. Olivier)**

CUBA.—St. Vincente, April 6-9 (S. C. Bruner and J. Acuna); Coll. Amer. Mus. Nat. Hist.

***Callopisma janthinipennis* (Jacquelin Duval)**

CUBA.—Est. Cent. Agric. de Cuba, June 11 and October 7 and 12, on leaves of sugar cane (B. T. Barreto); Coll. Amer. Mus. Nat. Hist. and Coll. Estacion Exp. Agronomica, Cuba.

ERYTHROLYCHNIA Motschulsky

This genus, peculiar among the Lampyridæ on account of the males having only seven segments on the ventral part of the abdomen, seems to be confined to the island of Hispaniola. The six species (one of which I am describing as new) thus far included in the genus are from that island. The species may be separated by the following key.

- 1.—Elytra black at apex only 2.
 Elytra with both base and apex black or brown. 4.
- 2.—Color dull yellow; antennæ pale in color, basal part of all the joints pale, apical ends waxy white; palpi pale brown *albopalpis*.
 Color reddish or reddish yellow, antennæ dark in color and apical parts of joints similar in color to their central portion; palpi dark 3.
- 3.—Pronotum generally with two small, almost approximate dark spots on the central portion of disk; apical black mark on the elytra at its greatest length, approximately one-half the length of the elytra *fulgidus*.
 Pronotum without black spots; apical black spot on the elytra at its greatest length, one-fourth to one-third the length of the elytra *bipartitus*.

- 4.—Disk of pronotum without black or dark spot; apical and basal black spots on the elytra small but well defined. Length, 9 mm. *olivieri*.
 Disk of pronotum with dark spot. 5.
 5.—Color somewhat pale yellow; apical and basal black spots on the elytra small, apical ones sometimes ill defined. *quinenotatus*.
 Color reddish brown; apical and basal spots on the elytra very black, well defined, apical spots larger than the basal ones. *clarki*.

***Erythrolychnia bipartitus* (E. Olivier)**

ST. DOMINGO.—No definite locality; Coll. British Museum.

***Erythrolychnia quinenotatus* (Castelnau)**

ST. DOMINGO.—No definite locality; Coll. British Museum. HAITI.—Port au Prince (at light), January 1 to April 7 (F. E. Watson); Coll. Amer. Mus. Nat. Hist.

***Erythrolychnia clarki*, new species**

Figure I

Reddish brown. Front of head blackish brown, somewhat deeply excavated between the eyes in the male, nearly flat in the female. Antennæ blackish with basal joint and basal part of each joint reddish brown; pubescent and with longer stiff hairs, especially noticeable on the apical ends of the joints. Pronotum broadly rounded in front, basal angles slightly acute; anterior and lateral margins turned upward; lateral submargin somewhat more deeply impressed apically; somewhat coarsely punctate, more finely on the disk than on the margins; pubescence short, yellowish; disk with an elevated ridge which extends from the basal margin to about the apical third, and with a large, more or less squarely outlined, discal black spot which does not extend to the basal margin. Scutellum moderately punctate and somewhat thickly clothed with a short yellow pubescence. Elytra elongate oval, base and apex black, basal black color covering the basal and humeral margins and the sutural margin from the base to the apex of the scutellum where it branches outward from the suture; it also somewhat irregularly curves from the lateral margins a short distance behind the humeri, extending on the disk to about one-third the length of the elytra. The apical black marking extends to about the middle on the disk of the elytra and is slightly more advanced on the middle of the disk than on the lateral margin and about twice as far as on the suture, making a V-shaped sutural indentation of the red color. Underside yellowish brown, pubescent; ventral segments of the abdomen more or less mottled with darker color, fifth segment with a luminous spot on its central portion which extends to the apical and basal margins and about one-half the width to the side margins. Legs reddish brown, last joint of tarsi slightly darker. Length, 11.5 to 14 mm.

HAITI.—Holotype male, No. 26976, and allotype female, No. 26977, Charpentier, March 19, 1922. Two male and two female paratypes, No. 26978, La Moriniere, March 1-5; Aux Cayes, March 15 to 18; Charpentier, March 19 (F. E. Watson); Coll. Amer. Mus. Nat. Hist.

This species is generally larger than any of the other five species of the genus. The black color on the apex of the elytra is similar in outline

to that on *fulgidus*. The basal black marking is much larger and the spot on the pronotum is also much larger than in any of the other species which are similarly marked; this spot, in some of the specimens, is slightly indented at the middle of the base with paler color.

Dedicated to Mr. B. Preston Clark in recognition of his many generous gifts to the American Museum and especially those which enabled Mr. Watson to make an expedition for this Museum to Haiti during the winter of 1921 to 1922.



Fig. 1. *Erythrolychnia clarki*, new species. Type.

***Aspisoma ignitum* (Linnæus)**

ANTIGUA.—June 1 and July 12 (L. Stoner); Coll. Univ. of Iowa.

***Pyractomena vitticollis* Motschulsky**

This species was not represented in the collections which Mr. Leng and I had before us during our studies of the West Indian material but it has since been collected by Mr. F. E. Watson.

In Bull. Amer. Mus. Nat. Hist., XLVI, p. 454, Mr. Leng and I gave a translation of Motschulsky's description of the species which reads: "Pronotum testaceous with two very approximate brown vittæ each having at base an orange spot which reaches the margin in some examples. Elytra black, bordered with testaceous. Scutellum black,

bordered with yellow. Length, 8.6 mm." The three specimens which were collected by Mr. Watson vary slightly from the above, as the following description will point out.

Pronotum testaceous, with two dark brown vittæ on the disk which are approximate to, but do not reach, the apical and basal margins; basal parts of the vittæ somewhat squarely turned outward and extending along the sub-basal margin at right angles with the discal portion of the vittæ, the rosy spot on the disk extends from the dark sub-basal line toward the apex, covering nearly the basal half of the pronotum, but the rosy color does not extend to the margins. Scutellum dark, without perceptible paler margins. Elytra dark, margined, except at base, with yellow, lateral pale color slightly broader than the sutural. Underside dark brown. Female with the central portion of the five basal ventral segments of the abdomen yellow, sixth and seventh margined at apex with yellow; seventh with a somewhat narrow Λ -shaped incision at the apex. Male with the four basal segments yellow at their central portion, fifth and sixth yellow, seventh and eighth brown; seventh squarely truncate. Legs dark brown, apex of femora and tibiæ darker. Length, 10 mm.

HARTI.—Carrefour, January 7; Manville, February 6-10; Aux Cayes, March 15-18 (F. E. Watson); Coll. Amer. Mus. Nat. Hist.

***Pyractomena galeata* E. Olivier**

PORTO RICO.—La Pata, June 11 (G. B. Merrill); Coll. Insular Exp. Sta. Porto Rico.

***Pyractomena gamma* (Jacquelin Duval)**

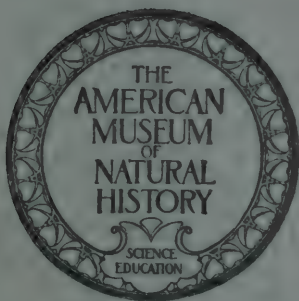
CUBA.—Manzanillo, July 31 (C. H. Ballou and S. C. Bruner); Playa de Batabano; Coll. Amer. Mus. Nat. Hist.

AMERICAN MUSEUM NOVITATES

No. 61

SIX NEW BATRACHIANS FROM THE DOMINICAN REPUBLIC

By G. K. NOBLE



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SIX NEW BATRACHIANS FROM THE DOMINICAN REPUBLIC

By G. K. NOBLE

Through the generosity of Museum friends, the donors of the "Angelo Heilprin Exploring Fund," an expedition was sent during the past summer to study the reptiles and amphibians of the Dominican Republic.

Although the primary purpose of the expedition was to secure exhibition material, a large amount of scientific data was brought together at the same time. The present paper deals briefly with the new species of Salientia secured by the expedition. In a subsequent paper, now in preparation, these species will be more fully discussed. This second paper will deal with the habits and life histories of most of the Dominican Amphibia. The species described below will be figured in that paper and a comparison of their voices and habits made. It may be stated here that all the species described below have a distinctive voice and coloration in life. Never in the field did the slightest confusion arise in recognizing the species. In the following descriptions the distinctive features of only preserved material have been indicated. Each species is represented in our collections by a large series of specimens.

Hyla heilprini,¹ new species

DIAGNOSIS.—A medium-sized *Hyla* differing remarkably from any other Greater Antillean species in possessing a dagger-shaped prepollex visible in both sexes but enormously developed and with exposed point in the male; fingers two-thirds, toes completely webbed; vomerine teeth in two straight series on a level with the posterior border of the choanae. Coloration in preserved material largely dependent on fixation; a series of transverse bars of a dark color and a scattering of white specks usually present on the dorsal surface and readily distinguishing the species from other Dominican forms.

TYPE.—A. M. N. H. No. 11401; adult, ♂; among stones in ravine of mountain torrent, Lo Bracita, Prov. Pacificador; August 20, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Tongue broader than long, emarginate behind; vomerine teeth in two groups in contact and forming almost a continuous series between the choanae on a level with their posterior margin; head much broader than long; nostrils near the end of the snout, the distance from the extreme tip (midpoint) of

¹Named in honor of the late Professor Angelo Heilprin, geologist, artist, philosopher; student of natural phenomena in the West Indian region.

snout to nostril contained more than two times in the distance between nostril and eye; snout rounded; interorbital width greater than the greatest diameter of the eye; no indication of ossification in the derm of head; canthus rostralis rounded, the loreal region sloping gradually; tympanum distinct, slightly more than half the greatest diameter of the eye. Hind limb being adpressed, the tibio-tarsal articulation reaches nearly to the nostril; digits with large discs, of the same diameter as the tympanum; fingers two-thirds webbed, toes completely webbed (but the web does not reach the disc of the fourth toe); a large, recurved prepollex with an exposed spine directed inward. Skin finely glandular above, almost smooth; skin of abdomen and ventral surfaces of the thighs coarsely granular; a supra-tympanic fold but no dorso-lateral one; a subgular vocal sac present.

Ground tone (of preserved specimen) pale grayish blue above, suffused with a darker tone; some indication of nine transverse bars of a dark brown on the back; a more distinct series of five or six bars on the thighs; upper surface sprinkled with about thirty small white spots; ventral surfaces straw-color to yellowish; axilla a bright orange; groin and inner side of arms and part of the gular region a bluish tone; posterior surfaces of thighs of the same pale tone as the ventral surfaces.

MEASUREMENTS

Tip of Snout to Vent.....	48.0 mm.
Tip of Snout to Posterior Border of Tympanum.....	17.0
Greatest Breadth of Head.....	18.5
Distance from Axilla to Tip of Longest Finger.....	31.0
Distance from Vent to Tip of Longest Toe.....	81.0
Tibia.....	26.0

Eleutherodactylus flavescens,¹ new species

DIAGNOSIS.—A medium sized *Eleutherodactylus*, with broad head and depressed body. Readily distinguished from all other Dominican frogs by its notched digital expansions, warty skin, and distinctive coloration.

TYPE.—A. M. N. H. No. 11402; adult, ♀; bushes along stream bank, Lo Bracita, Prov. Pacificador, Dominican Republic; August 8, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Head slightly broader than long, broader than the body; distance between anterior corner of eye and nostril equals the interorbital width, two and a half times as great as the distance between nostril and tip of snout; canthus rostralis sharp, but the loreal region not concave; tympanum very distinct, one-half the greatest diameter of the eye, separated from the eye by a trifle less than half its own diameter. Tibio-tarsal joints of either side overlap when the legs are placed at right angles to the body; tibio-tarsal articulation reaches midway between eye and nostril. Discs of fingers and toes very pronounced, more or less distinctly notched anteriorly, the outer fingers appearing heart-shaped; digits slender; a rudiment of a web between the two outer toes, other digits free; a slight indication of a tarsal fold. Vomerine teeth in two arched series extending outward slightly beyond the inner edge of the choanae, the two series separated from each other by a space equal to half the length of one series; vomerine teeth well behind the choanae, separated from them

¹Named in reference to its yellowish coloration in life.

by a space equal to the distance between the two series of vomerine teeth; tongue large, slightly nicked behind. Skin warty above, the warts of various sizes and tending to form longitudinal series. The largest warts form a row on each side of the body, the next largest form a dorso-lateral row on each side and a medial row; between these five rows smaller warts tend to form one or more regular rows; ventral surfaces of abdomen and thighs granular.

Ground tone (in alcohol) pale grayish to straw-color; dorsum marked with an irregular pattern of dark brownish or black markings. Of these the most conspicuous is a wedge-shaped mark between the eyes, an irregular W on the shoulders and an irregular figure on the sacrum; the dark tone forming a canthal stripe, a tympanic ring, three or four cross stripes on the fore arm, and a few irregular bars on the tibia.

MEASUREMENTS

Tip of Snout to Vent.....	36.0 mm.
Tip of Snout to Posterior Border of Tympanum.....	12.5
Greatest Breadth of Head.....	13.8
Distance from Axilla to Tip of Longest Finger.....	23.0
Distance from Vent to Tip of Longest Toe.....	60.0
Tibia.....	20.0

Eleutherodactylus auriculatoides, new species

DIAGNOSIS.—Closely allied to *E. flavescentis* and *E. auriculatus*; distinguished from the latter by its smaller size, broader head, shorter leg and different coloration.

TYPE.—A. M. N. H. No. 11403; adult, ♀; bromeliads near Constanza-Jarabacoa Trail, Paso Bajito, Dominican Republic; September 4, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Head broader than long, broader than body; distance between anterior corner of eye and nostril equals the greatest diameter of the eye, a trifle less than the interorbital width; distance between nostril and tip of snout contained a trifle over two times in the distance between nostril and eye; canthus rostralis distinct, although the loreal region slopes gradually; tympanum distinct, its greatest diameter equal to a trifle less than half the greatest diameter of the eye; separated from the eye by a space equal to its diameter. Tibio-tarsal joints of either side overlap when the legs are placed at right angles to the body; tibio-tarsal articulation reaches the posterior corner of the eye. Disks of fingers and toes pronounced, rounded; digits free; second toe (measured with dividers from distal side of its base) longer than first; no tarsal fold. Vomerine teeth in two oblique series well behind choanæ, extending outward not beyond the inner edge of the choanæ; the two series separated from each other by less distance than that which separates them from the choanæ; tongue thick, slightly nicked behind. Skin finely granular above; the granules forming more or less regular rows on the sides; belly, and thighs (except flash surfaces) coarsely granular.

Ground tone (in alcohol) a pale gray or flesh-color; tip of snout and parietal region with adjacent parts of eyelids dark reddish brown, this giving the appearance of a light band across the head in front of the parietal region; a canthal and supra-tympanic streak of dark reddish brown; back and upper surfaces of limbs diffused with brown, leaving only an indistinct W on the occiput and a)(mark anterior to the pelvis of the pale ground tone; ventral surfaces straw-color, slightly diffused with brown on the sides.

MEASUREMENTS

Tip of Snout to Vent.....	33.0 mm.
Tip of Snout to Posterior Border of Tympanum.....	12.0
Greatest Breadth of Head.....	14.0
Distance from Axilla to Tip of Longest Finger.....	18.5
Distance from Vent to Tip of Longest Toe.....	51.5
Tibia	16.0

***Eleutherodactylus minutus*, new species**

DIAGNOSIS.—Closely allied to “Abbott’s Macito”¹ preserved specimens; distinguished from that species by their smaller size, more distinct dorso-lateral fold, their narrower head and blunter snout; the coloration alone is distinctive; side of the body below dorso-lateral fold mottled or spotted with dark brown, while in “Abbott’s Macito” the mottling is indefinite or at least does not form a dark dorso-lateral stripe posteriorly.

TYPE.—A. M. N. H. No. 11404; adult ♀; on ferns in dense palm thicket near Paso Bajito, Jarabacoa-Constanza Trail, Dominican Republic; September 4, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Head as long as broad, slightly narrower than body; distance between anterior corner of the eye and nostril less than the greatest diameter of the eye, about equal to the interorbital width; distance between the nostril and tip of the snout contained two times in the distance between nostril and eye; canthus rostralis very sharp, the loreal region concave; tympanum distinct; its diameter contained a little over two times in the diameter of the eye; separated from the eye by a space equal to three-fourths of its diameter. Tibio-tarsal joints of either side overlapping slightly when the legs are placed at right angles to the body; tibio-tarsal joint reaches the posterior border of the tympanum. Digital dilations very small, the discs equal to a third or a fourth the greatest diameter of the tympanum; digits free, second toe slightly longer than the first; no tarsal fold; vomerine teeth in two small, oblique groups far behind the choanae and separated from each other by a wide space; tongue elliptical, unemarginate behind. Skin smooth above and below; a glandular dorso-lateral fold extending from the eye to lumbar region.

Ground tone above flesh-color to pale gray, ventral surfaces slightly paler; a stripe of dark brown extending from the nostrils along the canthus rostralis to eye, broadening out behind the eye to form a conspicuous supra-tympanic crescent, another stripe of dark brown extending along the dorso-lateral fold to anus, the stripe interrupted at a number of points; sides of the body immediately below the dorso-lateral fold mottled or spotted with dark brown; the lower half of the sides feebly stippled with brown, posterior surfaces of the thighs dark brown, a narrow white line running obliquely across each thigh and meeting its mate of the opposite side above the anus; posterior surfaces of the tibia washed with dark brown; two or three feebly indicated bars across the dorsal surfaces of the tibia.

¹This species was recently sent me through the kindness of Dr. W. L. Abbott, the collector. It is the commonest form of *Eleutherodactylus* in Santo Domingo. Dr. Abbott’s material is being described by Miss D. Cochran, of the U. S. National Museum, and it will not be long before a scientific name is available for the species.

MEASUREMENTS

Tip of Snout to Vent.....	17.5 mm.
Tip of Snout to Posterior Border of Tympanum.....	6.5
Greatest Breadth of Head.....	6.2
Distance from Axilla to Tip of Longest Finger.....	9.5
Distance from Vent to Tip of Longest Toe.....	25.0
Tibia.....	8.2

***Eleutherodactylus schmidti*¹ new species**

DIAGNOSIS.—Allied to *E. veinlandi* and *E. lentus* of the Dominican Republic and to *E. richmondi* of Porto Rico, but readily distinguished from these species by its coloration. Tibio-tarsal articulation marking anterior corner of eye or slightly beyond; discs of digits small; dorsal surface grayish brown, heavily marbled with dark brown; a light interorbital streak; two pale dorso-lateral stripes rarely present; under-surfaces of hind limbs bright salmon to pink.

TYPE.—A. M. N. H. No. 11405; adult ♀; among stones along stream bed, Lo Bracita, Prov. Pacificador, Dominican Republic; August 9, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Head as long as broad, slightly narrower than body; distance between anterior corner of eye and nostril slightly less than the greatest diameter of the eye, slightly greater than the interorbital width; distance between nostril and the tip of snout contained once and four-fifths times in the distance between nostril and eye; canthus rostralis rounded; loreal region moderately abrupt; tympanum distinct, its greatest diameter contained a trifle over two times in the greatest diameter of the eye, separated from the eye by a space equal to two-thirds its diameter. Tibio-tarsal joints of either side overlap slightly when the legs are placed at right angles to the body; tibio-tarsal joint reaches the anterior corner of the eye. Digital dilations small, the discs not greater than half the diameter of the eye; digits free; second toe much greater than the first; no tarsal fold. Vomerine teeth in two oblique series extending outward to the outer edge of the choanae; vomerine teeth very close to choanae, separated from them by less distance than separates the two vomerine series from each other; tongue large, slightly nicked behind. Skin finely granular above, the granules not forming distinct rows, ventral surfaces smooth.

Ground tone above pale brownish gray, heavily spotted and marbled with dark brown, the dark tone forming cross-bars on the limbs a pale interorbital stripe present and some indication of a semicircle above the anus. Ventral surface of body flesh-color, under surfaces of hind limbs salmon-color; throat, chest and sides of abdomen stippled and suffused with dark brown.

MEASUREMENTS

Tip of Snout to Vent.....	43.5 mm.
Tip of Snout to Posterior Border of Tympanum.....	16.0
Greatest Breadth of Head.....	16.0
Distance from Axilla to Tip of Longest Finger.....	26.0
Distance from Vent to Tip of Longest Toe.....	71.0
Tibia.....	22.0

¹Named in honor of Mr. Karl Patterson Schmidt, formerly associated with the American Museum but now in charge of Herpetology at the Field Museum of Natural History, Chicago.

***Eleutherodactylus ruthi*,¹ new species**

DIAGNOSIS.—Closely allied to *E. inoptatus* but readily distinguished from that species and all other West Indian frogs by its shovel-shaped snout; it further differs from *E. inoptatus* in its shorter head, shorter leg and more spotted dorsum.

TYPE.—A. M. N. H. No. 11406, adult ♂; Samaná, Dominican Republic; November 8, 1922; John King.

DESCRIPTION OF TYPE.—Head broader than long, slightly narrower than body; distance between nostril and eye slightly greater than the greatest diameter of the eye, equal to the interorbital width; distance between nostril and tip of snout contained less than twice in the distance between eye and nostril; snout pointed, produced into a shovel, the latter one-third the diameter of the eye; the shovel in profile forming a step with the rostrum proper; canthus rostralis sharp, loreal region concave and sloping gradually; tympanum distinct, its greatest diameter contained once and two-thirds in the greatest diameter of the eye, separated from the eye by a space equal to one-half its diameter. Tibio-tarsal joints of either side slightly overlap when the legs are folded at right angles to the body; tibio-tarsal joint reaches midway between eye and nostril. Digital dilations moderate, those of the manus about half the diameter of the tympanum, distinctly larger than those of the pes; digits free except for a slight indication of a web between the two outer toes; second toe slightly longer than the first, no tarsal fold. Vomerine teeth in two oblique series extending outward to the outer edge of the choanae, separated from the choanae by a short distance, which is about equal to the space separating the two series of vomerine teeth from each other; tongue large, slightly emarginate behind. Skin glandular and finely warty above, a dorso-lateral glandular fold, a supra-tympanic fold and an oblique fold on the side of the body; warts best developed on sides of body; periphery of the abdomen, and posterior faces of the thighs highly glandular.

Ground tone (in alcohol) a pale purplish gray or clay-color; a canthal stripe, an interorbital stripe, a supra-tympanic spot and two rows of large irregular spots on the back of a dark purplish brown; two cross-bars on the forearm, six on the thighs and three or four on the lower leg of the same color; upper surfaces suffused with a dark tone leaving pale rings of ground tone around many of the dark spots and bars; posterior surfaces of the thighs purplish brown spotted with gray or white; ventral surfaces whitish, throat, sides of abdomen, and thighs stippled with purplish brown.

MEASUREMENTS

Tip of Snout to Vent.	49.0 mm.
Tip of Snout to Posterior Border of Tympanum.	18.5
Greatest Breadth of Head.	20.0
Distance from Axilla to Tip of Longest Finger.	32.0
Distance from Vent to Tip of Longest Toe.	79.0
Tibia.	27.5

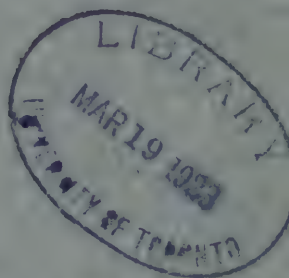
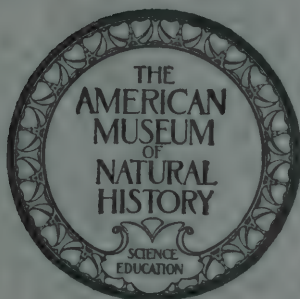
¹Named in honor of my wife, Mrs. Ruth Crosby Noble, who discovered this species and collected the first series of specimens; all now living in the "moss gardens" of The American Museum of Natural History.

AMERICAN MUSEUM NOVITATES

No. 62

THE SUPPOSED PLUMAGE OF THE EOCENE BIRD *DIATRYMA*

By T. D. A. COCKERELL



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THE SUPPOSED PLUMAGE OF THE EOCENE BIRD *DIATRYMA*

By T. D. A. COCKERELL

Plumage, the unique possession of birds, dates back to at least the Upper Jurassic. It is so well developed in the *Archæopteryx* of that era that we may reasonably expect to find it considerably earlier, should there exist a deposit capable of preserving recognizable traces of it. According to Petronievics, the specimens of supposed *Archæopteryx* in the British and Berlin Museums represent different genera, not merely species as Dames had maintained. It appears that the Berlin specimen must take the name *Archæornis siemensii* (Dames), and in certain characters it is said to approach the carinate type, while the British Museum example shows more ratite features. As the genus *Archæopteryx* was based by Meyer (1861) on a feather, it appears to be somewhat hazardous to identify it with one or another of the well-preserved forms and, according to the facts given by Lydekker ('Cat. Fossil Birds,' p. 362), the British Museum specimen seems to be entitled to the name *Griphosaurus problematicus*.

In the light of these facts, and in consideration of all we know about Mesozoic birds, we have little ground for considering any Tertiary or modern bird primitive on account of its lacking the power of flight or possessing hair-like feathers. Even in the Cretaceous, certain birds were so far advanced that Shufeldt has not hesitated to refer one of them (*Graculavus lentus* Marsh) to the modern genus *Pedioecetes*, judging from the distal end of a tarso-metarsus. In the heading of his account (Trans. Conn. Acad., XIX, p. 25) he actually calls it *P. phasianellus* (L.), but the true purport of the observations below would be better indicated by calling it *Pedioecetes* (?) *lentus*. As Matthew and Granger indicate, it is hardly to be doubted that the discovery of the whole skeleton would compel us to recognize a perfectly distinct genus. Nevertheless, modernization and differentiation had gone far by the time we come to the Eocene and, as regards the feathers, there was probably no striking advance remaining to be made. The promise of the future was rather in the development of the voice and in arboreal and nest-building adaptations and developments. Even the mechanism for maintaining a high temperature must have been already perfected.

In the midst of this rather orderly and consistent development certain extraordinary types appear, both in the living and extinct faunas. They do not represent the expectations of orthogenesis and must be regarded as specially adapted forms, made, like the caricatures of the cartoonist, by exaggerating certain features to the point of grotesqueness. Such a bird is the *Diatryma* of the Wasatch, fully elucidated from a magnificent specimen by Matthew and Granger (Bull. Amer. Mus. Nat. Hist., XXXVII, pp. 307-326). Of the four species ascribed to *Diatryma*, only *D. steini* is known by the major part of the skeleton. The others are represented by very imperfect fragments of the feet. Nothing has been known of the plumage but, although the authors (p. 309) suggest that the bird is closest to *Cariama*, the very convincing restoration by Mr. Erwin S. Christman (Pl. xxxiii) shows hair-like plumage like that of a cassowary.

The vicinity of Roan Creek in western Colorado has long been known to palæontologists on account of the discovery of numerous fossil insects, ascribed to the Green River Eocene. It is a region of high mesas or hills, separated by gigantic valleys, which have not yet been accurately mapped, topographically or geologically. The enormous exposures are all in the Eocene, apparently Wasatch at the bottom of the valleys and Green River at the top. Before going there I was prepared to believe that the shales ascribed to the Green River were not really contemporaneous with the typical beds in Wyoming; but the longer one worked in them the closer seemed to be the resemblance to the genuine Green River deposit, and no hesitation remains in ascribing the whole series to a single epoch. Granting this, it is of course still true that horizons will have to be elucidated and will probably show marked differences in their contents. The good fossiliferous levels in the Roan Mountains are high up, but some distance below the tops of the mesas. In certain places they are indeed on top, but this occurs on spurs from the main elevations which have been worn down to a lower level. The fossil-bearing beds are known as the oil shales, and the hard gray rock will burst into flame when placed on a fire. At very numerous places assessment holes have been dug and, although it is doubtful whether the money thus invested will be recovered, the palæontologist finds most of his heavy work done for him and has only to pick up and split the shale upon the dumps. Now indeed is the golden time to collect fossils in this area, as in five years' time the exposed shales will have crumbled to dust and it is not probable that the digging of holes will continue indefinitely.



Fig. 1. Feathers from the Eocene.

A, Contour feather of unknown bird.

B, C, Plumage of *Diatryma* (?) *filifera*.

Passing up the old Ute trail above Seller's Ranch, a mile or more before reaching the Osborn cabin, there is a considerable excavation which we designated Station No. 1. The holes, blasted out in successive years, are like so many gigantic steps on the side of the mountain, the uppermost practically on the top. Later on it will be possible to describe

the fossil insects and plants taken from this location. Among other things, we found a typical contour feather of a bird, perhaps the oldest ordinary feather known (Fig. 1). At the lowest hole, which was in general unproductive, Mrs. Cockerell was so fortunate as to find long strands of plumage which look as if they might have come from the very *Diatryma* figured by Mr. Christman. Repeated study, with lens and microscope, shows that they are not vegetable fibres, nor are they mammalian hairs. They are not filoplumes, according to Chandler's ('A Study of the Structure of Feathers, with Reference to their Taxonomic Significance,' Univ. of Calif. Publ., Zool., 1916) definition, but are like the very slender simple feathers of the *Casuariformes*, particularly the cassowary. Chandler says of the cassowary:

The naked terminal portion of the feather, which sometimes constitutes three-fourths of the entire feather and reaches a length of over 20 cm., sometimes has the stiff bristle-like naked barbs present in decreasing numbers all the way to the tip, where there are only two or three per centimeter on each side, while in other cases, especially in shorter feathers, the naked shaft is produced as a very coarse, stiff bristle.

The fossil plumage now described had a length of fully 20 cm., probably much more. It was apparently very dark, appearing black upon the stone. It was soft and wavy, not bristly. All the filaments appear to be perfectly simple. The average filament has a diameter of about $65\ \mu$; but there also occur slender, pale brown ones only half as wide. The surface mottling resembles that in Chandler's figure of *Casuaris*. In places the filaments are bent instead of curved. There is no resemblance to the plumage of *Cariama*, but, as compared with the cassowary, the plumage seems to have been even more filiform, more delicate and soft, less bristly.

Among the known Eocene birds, this could only have come from *Diatryma*. The horizon is considerably higher than any known for that genus and no doubt a different species, at least, is concerned. Until we know more about the matter, this plumage may be designated *Diatryma* (?) *filifera*, new species.

AMERICAN MUSEUM NOVITATES

No. 63

NOTES ON WEST INDIAN LAMPYRIDÆ AND CANTHARIDÆ (COLEOPTERA) WITH DESCRIPTIONS OF NEW FORMS

BY ANDREW J. MUTCHLER



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NOTES ON WEST INDIAN LAMPYRIDÆ AND CANTHARIDÆ (COLEOPTERA) WITH DESCRIPTIONS OF NEW FORMS

BY ANDREW J. MUTCHLER

In Novitates No. 60, footnote on page 2, I remarked that I had in hand records of Lampyridæ belonging to the genera *Photinus* and *Photuris* and some species of Cantharidæ. These records, now ready for publication, include specimens received from the following sources: British Museum, sent by Mr. G. J. Arrow; Mr. Geo. N. Wolcott of the Insular Experiment Station at Rio Piedras, Porto Rico; University of Iowa, sent by Dr. Dayton Stoner; Estacion Experimental Agronomica, Santiago de las Vegas, Cuba, sent by Mr. Stephen C. Bruner, Chief of the Department of Entomology and Vegetable Pathology; also a number from Haiti, collected by Mr. F. E. Watson of this Museum, whose expedition to that part of the Island of Hispaniola was made possible through the generosity of Mr. B. Preston Clark.

Lampyridæ

Photinus pallens (Fabricius)

JAMAICA: without any definite locality; Coll. British Museum.

Photinus heterodoxus Leng and Mutchler

Two specimens of this species, in the collection of the Insular Experiment Station of Porto Rico, which are merely labeled "PORTO RICO," differ slightly from the type. One of the specimens has a somewhat well-defined brown spot on the disk of the pronotum, which extends from the base to about the apical third. The elytra in both specimens are somewhat darker. The basal abdominal segments are darker and the apical ones are not waxy white.

Photinus ceratus Leng and Mutchler

JAMAICA: no definite locality; Coll. British Museum.

Photinus glaucus (G. A. Olivier)

CUBA: Sierra Maestra, July 10-20, alt. 3600 to 4300 feet (C. H. Ballou and S. C. Bruner); Coll. Estacion Exp. Agronomica, Santiago de las Vegas, Cuba.

The three specimens from Cuba which I have seen do not agree in every respect with those from Jamaica. Further study with a larger series may show sufficient differences to require them to be separated from *glaucus*.

***Photinus lutzi* Leng and Mutchler**

DOMINICA: Laion (G. A. Ramage); Coll. British Museum.

***Photinus dubiosus* Leng and Mutchler**

PORTO RICO: Larres, March 7 (F. Sein); Rio Piedras, April 5 (Geo. N. Wolcott); Coll. Insular Exp. Sta., Rio Piedras, Porto Rico.

***Photinus pygmæus* E. Olivier**

CUBA: Sierra Maestra, alt. 3000 to 4200 feet, July 10-20; Pico Turquino, alt. 3500 feet, and summit,¹ July 20 and 22; and Nagua Oriente, July 7 (S. C. Bruner and C. H. Ballou); Camagüey, July to August (J. Acuna); Coll. Amer. Mus. Nat. Hist. and Coll. Estacion Exp. Agronomica, Cuba.

There are thirteen specimens among the above material received from Mr. S. C. Bruner which I have identified as this species. These specimens range from brownish black to deep black in color and are from 3 to 6.5 mm. in length.

***Photinus lengi*,² new species**

Figure 1

MALE.—Elongate. Head black, somewhat deeply depressed between the eyes. Mandibles brown, darker on inner margin. Antennæ black, longer than the head and thorax. Pronotum testaceous, thinly clad with moderately long, yellow pubescence, disk rosy with more or less defined darker spots or markings; margins somewhat coarsely but not very closely punctate, disk less coarsely punctate. Scutellum yellow, more or less rosy at base. Elytra covering the abdomen, dark brown bordered except at base with pale yellow, somewhat closely punctate and covered with a short yellow pubescence, lateral margins somewhat broadly flattened. Underside reddish yellow. Metasternal episternum wholly, and sides of metasternum narrowly fuscous, first to fourth ventral segments of the abdomen more or less broadly darkened through the central portion, fifth and sixth black, seventh with waxy white light organs at the

¹There are several specimens among the material sent by Mr. S. C. Bruner which are marked "Cumbre" (Summit) when referring to altitude. All specimens so marked are from Pico Turquino, the summit of which, according to published records, is approximately 2400 meters (about 7800 feet) above sea-level.

²Dedicated to my good friend and co-worker, Mr. Chas. W. Leng, senior author of our work on the Tychidae, Lampyridae, and Cantharidae (Telephoridae) of the West Indies, to whom I am indebted for many favors and also for his kindness in reading the manuscript and checking up the new species included in this and my former paper.

basal part, apex of seventh and the small eighth segment dark. Femora yellow. Tibiæ and tarsi darker. Length, 8.5 to 10.5 mm.

FEMALE.—Head broad and feebly depressed between the eyes. Pronotum yellow, disk yellow with dark central spot. Scutellum wholly yellow. Elytra about one-half as long as the abdomen, leaving four dorsal segments fully, and the greater part of a fifth, uncovered. Exposed dorsal segments of the abdomen with a median costa, first three exposed segments becoming gradually darker, the two apical ones black. Underside yellow; metasternal episternum black; apical three segments of the abdomen darker, last segment with a pair of waxy white, light organs at the base, otherwise as in the male. Length, 11.5 mm.

HAITI: Holotype male, No. 26979, and allotype female, No. 26980, Port au Prince (at light), December 22 to 31, 1921. Paratypes male and female, Nos. 26981 and 26982, Port au Prince (at light), December 22, 1921 to April 11, 1922 (F. E. Watson); Coll. Amer. Mus. Nat. Hist.

The males of this species, at a superficial glance, resemble some specimens of *quadrimaculatus* but on examination they will be found to have the pale margins (especially the lateral ones) of the same width throughout, also the general color of the paler portions of the elytra whitish yellow. There are also two male specimens in the type lot in which the dark color on the disk of the elytra, behind the scutellum, is not fully developed, making the suture appear broadly margined basally; in these same specimens the dark spot on the disk of the thorax is barely perceptible, there being merely a dusky mark to indicate the spot. The two female paratypes seem to have just emerged (before capture) from the pupal shell as none of the darker colors are as well developed as in the allotype.

The species should be placed in the Pantoni group near *pantoni* and *suavis*.

Photinus magnus, new species

Elongate. Front of head light brown, somewhat deeply excavated between the eyes in the male, moderately impressed in the female, punctate and covered with a light brown pubescence. Mandibles pale yellowish brown at base, apex black. Palpi pubescent with an intermixture of longer hairs, black, apical joint with a streak of light brown at each side. Antennæ reaching about to the hind coxæ, black, pubescence moderately long and somewhat coarse. Pronotum somewhat broadly rounded in front, subapical and sublateral margins depressed, the sublateral being much more deeply so in the male than in female, somewhat coarsely punctate; pubescence very short, pale yellow with a few scattered black hairs; disk rosy, with darker spots. Male with a large dark spot on the middle of the disk, longitudinally divided at the



Fig. 1. *Photinus lengi*, new species. Female allotype.

base to about the apical third by the rosy color in the holotype, almost completely divided in the paratype, and with two minute dark spots on each side at the base, the inner spots paler than the outer ones. Female with four spots on the middle of disk, the two front ones smaller and paler in color than the two hinder ones, basal spots similar to those in the male. Scutellum pale yellow, coarsely punctate and pubescent. Elytra smoky black, moderately coarsely punctate and covered with a short, pale yellow pubescence, margined at the sides and suture with pale yellow; apex very vaguely margined. Underside yellow, more or less marked with dark brown in the holotype and allotype, brownish black in the paratype. Female with the apex and sides of the first to fifth ventral segments of the abdomen more or less black at the sides and apex, sixth wholly black, seventh with a waxy white spot at each side of the base and with a pale-colored longitudinal line through the center. Male with the sides and apex of the four basal segments very narrowly darker in the holotype, only slightly paler basally in the paratype, fifth and sixth black, seventh waxy white, small eighth yellowish brown. Legs yellow, apex of femora, inner margin of tibiae and all of tarsi brown. Length, male 14.5 mm., female 16.5 mm.

CUBA: Holotype male, No. 26983, and allotype female, No. 26984, Sierra Maestra, alt. 4500 feet, July 10–20, 1922 (C. H. Ballou and S. C. Bruner); Coll. Amer. Mus. Nat. Hist. Paratype male, Sierra Maestra, July 10–20, alt. 3600–4200 feet (C. H. Ballou and S. C. Bruner); Coll. Estacion Exp. Agronomica, Cuba.

***Photinus magnus* variety *turquino*, new variety**

MALE.—Form slightly more elongate. Center of the impressed front part of the head black, sides and apex margined with rosy color. Pronotum with only one large, central, squarely outlined black spot which has the basal center longitudinally divided by a narrow pale line. Elytra dark with pale margins continuous around the apex. Underside brownish black, seventh segment waxy white at base and sides. Otherwise as in the species.

FEMALE.—Unknown.

CUBA: Holotype, No. 26985, Summit of Pico Turquino, July 2, 1922 (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist.

***Photinus unicus*, new species**

MALE.—Oblong elongate. Head very moderately excavated between the eyes, yellow. Palpi yellowish brown. Antennae dark brown, about one-half as long as the body. Pronotum yellow, moderately broadly rounded at apex, submargins slightly impressed, disk with a longitudinal depression at basal half. Scutellum yellow. Elytra brownish black, margined, except at base, with yellow; sutural and apical margins narrower than the lateral. Underside dark brown, last two (including the small eighth) ventral segments of the abdomen whitish yellow. Legs brown, marked with paler color. Length, 5 mm.

FEMALE.—Unknown.

JAMAICA: Holotype; Coll. British Museum.

This species differs from all of the others from Jamaica, which have the elytra margined with paler color, in having the thorax of a uniform

pale color. In general appearance it resembles *apoplecticus* and *simplex*. It differs from *apoplecticus* in the form of the pronotum which is much more elongate and broader in *apoplecticus*. The antennæ also differ, they being shorter in *apoplecticus* than in this species. The species differs from *simplex* in the following respects: the antennæ are longer and the basal joint is not testaceous; the disk of the thorax is not rosy; the apical pale margin of the elytra is much narrower; the body beneath is darker in color; and the apex of the pronotum is less broadly rounded.

***Photinus simplex* (E. Olivier)**

DOMINICA: Laudat, March 30; Coll. British Museum.

***Photinus nefarius* (E. Olivier)**

CUBA: Nagua Oriente, July 7 (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist. Nagua Oriente, July 7 and Yara, July 5 (S. C. Bruner and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

***Photinus quadrimaculatus* (Castelnau)**

SANTO DOMINGO: no definite locality; Coll. British Museum. DOMINICAN REPUBLIC: Haina (Geo. N. Wolcott). HAITI: Port au Prince (at light), December 22, 1921 to March 29, 1922; Fond Parisien, February 11-18, and Aux Cayes (at light), March 15-20 (F. E. Watson); Coll. Amer. Mus. Nat. Hist.

The five male and eleven female specimens which are before me show a marked variation in the elytral markings. The black color on the disk of the elytra in many of the specimens forms a continuous line narrowed toward the middle and extending from the base to near the apical margin. In some this line is almost separated at the middle of the elytra, thus making the apical and basal parts appear darker. There is also a specimen in which the black color is barely noticeable at the base but is very prominent and forms a black spot near the apex of each elytron, and another which has the discal black markings covering the apical margins of the elytra.

***Photinus commissus* E. Olivier**

JAMAICA: no definite locality; Coll. British Museum.

The three specimens of this species which were received from Mr. G. J. Arrow of the British Museum are an extremely dark form of *commissus*. They have the disk of the pronotum darker and the elytra

blackish brown, leaving the outer apical margin pale. There is also a pale spot on the basal third and on the apical half of each elytron. In one of the specimens these spots are fairly large, in another they are quite small, and in a third they are scarcely discernible.

***Photinus discoideus* (Sahlberg)**

One specimen of this species in British Museum Collection, labeled "West Indies," is probably from Guadeloupe, as there are no records of the species being found in any of the other islands.

***Photinus limbipennis* Jacquelin Duval**

CUBA: Camagüey, December 29 (J. Acuna); Coll. Amer. Mus. Nat. Hist. and Coll. Estacion Exp. Agronomica, Cuba.

***Photinus sublateralis*, new species**

MALE.—Elongate oval. Head, between the eyes, black, very feebly excavated. Mandibles brown. Palpi with the two apical joints black, basal joints generally light brown. Antennæ about one-half as long as the body, dark brown, somewhat densely pubescent. Pronotum moderately broadly rounded at apex, basal angles acute, submargins depressed, somewhat coarsely but not closely punctate, lateral margins yellow, apical dusky; disk with a median longitudinal depression which extends from the base to slightly beyond the middle; rosy red, with a longitudinal dark mark which is narrow at the base and gradually broadens to apex. Scutellum dark brown. Elytra brown, slightly darker basally, broadly expanded at the basal two-thirds, closely punctate and covered with a short pubescence; margined with yellow, narrowly at the suture, more or less distinctly at the apex, moderately broadly at basal two-thirds of the lateral margins where the elytra are dilated. The extreme outer edges of the elytra are dark brown. Thorax beneath, rosy red. Underside of body blackish brown, except the two apical (including the eighth) segments of the abdomen which are pale brown. Legs varying from pale to dark brown. Length, 9.5–10.5 mm.

FEMALE.—Unknown.

CUBA: Holotype, No. 26986, and paratype, No. 26987, Pico Turquino, alt. 5500 to 6500 ft., July 20, 1922 (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist. Five paratypes, Pico Turquino, July 20 and 22, alt. 5000 to 5500 ft., and summit (S. C. Bruner and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

This species differs from any West Indian species in having the outer edge of the lateral pale margin of the elytra bordered with a darker color. One of the paratype specimens does not agree in every respect with the holotype. The disk of the pronotum is not as bright rosy red and the basal part of the black marking is merely indicated by black hairs. The pale margins of the elytra in some of the specimens are more or less disconnected at the apex. I believe the specimens represent one species.

Photinus vittatus (G. A. Olivier)

PORTO RICO: Guanica, December 10; Rio Piedras, March 23; Tao Alta, January 1; and La Plata, June 11 (Geo. N. Wolcott); Coll. Insular Exp. Sta., Rio Piedras, Porto Rico.

Photuris brunnipennis Jacquelin Duval

CUBA: Taco Taco, April 1-6 (S. C. Bruner, J. Acuna and C. H. Ballou); Coll. Amer. Mus. Nat. Hist. Taco Taco, April 1-6 (S. C. Bruner and C. H. Ballou); Santiago de las Vegas, October 31 (B. T. Barreto); Habana, January 20 (J. Acuna); Baracoa, April 19 (P. Cardini); Coll. Estacion Experimental Agronomica, Cuba.

The specimen from Santiago de las Vegas has lost all trace of the paler elytral margins but otherwise agrees with the description of *brunnipennis*.

Photuris jamaicensis E. Olivier

JAMAICA: Trouthall, Clarendon, November 17 (A. H. Ritchie); Coll. British Museum.

The specimen which I have identified as this species is much discolored, but I believe it to be *jamaicensis*.

Cantharidæ**Belotus cacumenum**, new species

Elongate. Head reddish yellow, with inconspicuous cloudy spots on the vertex, apex of labrum margined with black; moderately finely and somewhat closely punctate, covered with a short yellowish pubescence. Mandibles somewhat long with a broad triangular tooth on the middle. Palpi blackish brown, last joint moderately stout. Antennæ black, arising from frontal bosses, nearly as long as the body, moderately serrate; extreme base of the basal joint paler. Pronotum reddish yellow, somewhat finely and moderately closely punctate, subquadrate, somewhat longer through the middle line than at the sides; disk with a transverse impression at the base. Scutellum reddish yellow, apex arcuately emarginate. Elytra nearly two-thirds as long as the body black, somewhat shiny; each elytron with two, more or less obsolete, discal carina, the basal parts of which are joined together in a curve and begin on the basal center a short distance behind the base and extend obliquely to about the apical third; disk coarsely wrinkled punctate; extreme base and apical third finely wrinkled punctate; pubescence short, brown. Head and thorax beneath reddish yellow. Body beneath dark brown to black. Legs blackish brown covered with paler brown pubescence. Coxæ and trochanters pale yellow. Length, 5 mm.

CUBA: Holotype male?, No. 26988, Pico Turquino (Summit), alt. 6620 ft., July 20, 1922 (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist.

***Belotus balloui*, new species**

Elongate. Head reddish yellow with a faint dark V-shaped mark which extends from slightly in front of the middle of each eye to the center of the basal margin in the holotype, front of head black in the paratype; granulate punctate and covered with a short whitish pubescence. Palpi with the last joint moderately stout; antennae arising from frontal bosses, moderately serrate, black, base of first joint yellow; second joint slightly more than one-half as long as the third; third and following joints approximately equal in length. Pronotum reddish yellow, punctate, pubescent, broader than long, rectangular, slightly longer at the middle line than at the sides. Elytra rather indefinitely wrinkled punctate, about one-half as long as the abdomen, brownish black, margined at the suture with yellow and, in the holotype, narrowly yellow on the side margins. The sutural pale margins extend to the base in the holotype; only to the apex of scutellum in the paratype, those on the sides of the holotype are post-humeral. Body beneath black, except central portion of prosternum, apex of metasternum, and apical ventral segments of the abdomen, which are yellowish, abdominal segments margined at the sides with yellow in the paratype. Legs yellowish, base of femora, tibiae and tarsi on first two pair somewhat darker, hind pair with base of femora, apex of tibiae and tarsi only slightly darker. Length, 6 mm.

CUBA: Holotype, male?, No. 26989, Palma Mocha, Sierra Maestra, July 10-20, 1922, alt. 3500 to 4400 ft., (C. H. Ballou and S. C. Bruner); Coll. Amer. Mus. Nat. Hist. Paratype, Palma Mocha, Sierra Maestra, July 10-20, alt. 3500 to 4000 ft., (C. H. Ballou and S. C. Bruner); Coll. Estacion Exp. Agronomica, Cuba.

The two specimens from which this species was described do not agree in every respect as to color markings. The one which I have marked as paratype has the front of the head dark; the sutural pale margin of the elytra does not extend to the base and the outer margins are not bordered with paler color; the abdominal segments have the lateral margins bordered with pale yellow and the apical abdominal segments are not pale yellow. I believe they represent one species, as I can find no structural differences on which to separate them.

***Tytthonyx marginicollis*, new species**

MALE. —Elongate, shining. Upper part of head, from base to between the antennae, blackish gray; sides, front, and underneath pale yellow. Mandibles somewhat long, with a moderately large triangular tooth on the inner side of the middle; pale yellow, apex and tooth slightly darker. Labial palpi moderately long, pale yellow, apical joint darker. Antennae about two-thirds as long as the body, somewhat strongly serrate, light brown, pale beneath, basal joint club-shaped, second joint broad at apex, joints three to eleven gradually diminishing in thickness and gradually increasing in length. Pronotum blackish gray, margined at the apical angles, sides, basal angles and basal center with pale yellow, apical and basal angles broadly rounded; somewhat finely punctate, pubescence light brown, disk impressed somewhat broadly at the apical sides and basal center, apical center more narrowly longitudinally impressed. Scutellum pale yellowish, apex squarely truncate. Elytra less than one-half the length of the body, dehiscant, rounded at apex, slightly paler than the thorax

in color. Underside pale yellow. Last ventral segment completely divided, penultimate segment deeply arcuately emarginate, the two segments forming together an elongate cavity in which the genitalia lie. Legs yellow, apex of tibiae and tarsi slightly darker. Length, 3 to 4.25 mm.

FEMALE.—Unknown.

ANTIGUA: Holotype, No. 26990; Coll. Amer. Mus. Nat. Hist. One paratype; Coll. University of Iowa. Both specimens collected June 18.

***Tytthonyx discolor* Leng and Mutchler**

PORTO RICO: Larres? Coll. Insular Exp. Sta., Rio Piedras, Porto Rico.

***Silis marginella* Jacquelin Duval**

CUBA: Viñales, April 6–9; Camagüey, July to August (S. C. Bruner and J. Acuna); Coll. Amer. Mus. Nat. Hist. Camagüey, July to August; Taco Taco, April 1–6 (S. C. Bruner, J. Acuna and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

***Silis (Haplacroselis) impressa* (Pic)**

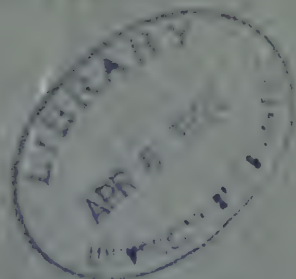
CUBA: near Pico Turquino, alt. 4500 ft, July 20 (S. C. Bruner and C. H. Ballou); Coll. Amer. Mus. Nat. Hist. Pico Turquino, July 20, alt. 4500–5500 ft., (S. C. Bruner and C. H. Ballou); Coll. Estacion Exp. Agronomica, Cuba.

***Tylocerus coriaceus* Leng and Mutchler**

HAITI: Port au Prince, January 15 to March 21 (at light) and Petionville, January 25 to 29 (at light), (F. E. Watson); Coll. Amer. Mus. Nat. Hist.

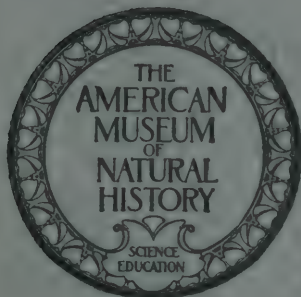
AMERICAN MUSEUM NOVITATES

No. 64



FOUR NEW LIZARDS FROM BEATA ISLAND, DOMINICAN REPUBLIC

By G. K. NOBLE



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FOUR NEW LIZARDS FROM BEATA ISLAND, DOMINICAN REPUBLIC

BY G. K. NOBLE

This is the second paper to appear dealing with the results of the "Angelo Heilprin Expedition to the Dominican Republic." While investigating the life history of the Rhinoceros Iguana, *Cyclura cornuta* (Bonnaterre), I spent four days (October 1 to 4 inclusive) on Beata Island off the southwestern coast of the Dominican Republic. As no reptiles had previously been recorded from Beata, I made an effort to secure a representative collection. The four species described below were recognized in the field as distinct from their relatives on the mainland (Dominican Republic).

The four species include only a part of the herpetological fauna of Beata Island. In a subsequent paper I shall discuss the fauna as a whole and compare it with that of the mainland. It may be mentioned here that all the reptiles of the island have been derived from stocks existing today in the arid southwestern part of the Dominican Republic. The species described below are represented in the collection by a series.

Ameiva abbotti,¹ new species

DIAGNOSIS.—A brilliantly colored lizard closely related to *A. chrysolæma*; agreeing with that species in its straight-keeled caudal scales, its four supraoculars, and its ten rows of ventral scales; differing from *A. chrysolæma* in having the prefrontals more broadly in contact, the frontal in contact with the third ocular, or separated by a row of small scales. The preaxial row of antebrachials and the brachials small, femoral pores more than twenty. Differing from *A. chrysolæma* and all other species of the genus in its coloration: dorsal surface of head olive-brown, of body black or very dark brown mottled with black; a series of large spots (1 to 3 mm. in diameter) forming about 12 to 18 longitudinal rows extending from the occiput to the base of the tail; the spots bluish or whitish above, bluish on the sides of the body and bright blue along the periphery of the abdomen; gular region and venter rosy pink; a broad band of black across the throat and chest, fading gradually into the pink of the abdomen. In life the dorsal spots greenish, the lateral ones bright blue in striking contrast to the black ground-tone of the back, the chestnut head and the rosy venter. Young with the distal part of the tail pale clay-color to white.

¹I take pleasure in naming this *Ameiva*, probably the most attractive teiid in the West Indian region, after the naturalist, Dr. W. L. Abbott, whose intimate knowledge of the Dominican Republic contributed greatly to the success of the expedition.

TYPE.—A. M. N. H. No. 24327; adult male; Beata Island, Dominican Republic; October 3, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Rostral forming an acute angle behind; nostril on the posterior part of anterior nasal; anterior nasals narrowly in contact behind rostral; fronto-nasal as wide as long, broadly in contact with the loreal; prefrontals broadly in contact, their suture nearly half the length of either prefrontal; frontal in contact with the first, second, and third supraoculars of each side; four supraoculars, the last half the size of the first; fronto-parietals separated from the third supraocular by one or two rows of granules; nine supraciliaries on one side, eleven on the other; these separated from the three posterior supraoculars by two rows of granules; the anterior granules enlarged and partly separating the first supraocular from the second; five occipitals, the median larger than the two outer but smaller than the two adjacent scales; two to three rows of post-occipitals; six enlarged upper labials to the middle of the eye, five enlarged lower labials to the same point; between lower labials and chin shields a wedge of small scales extending anteriorly to the postmental. Chin and throat covered with granular scales; of these the largest do not form a band across the middle but form three indistinct patches, the median patch not as extensive as the two lateral ones; collar with three rows of only slightly enlarged scales.

Dorsal scales minute, granular, uniform; ventral scales in ten longitudinal rows (not including the outer row of half size or smaller plates¹) and thirty-six transverse rows; preanal plates in a triangle three rows high and seven scales broad at the base. Antebrachials in one row of large scales and two series of smaller scales on the preaxial side; brachials in three to four rows of small scales, these not larger than the small antibrachials; antibrachials and brachials not forming a continuous series but interrupted by many rows of granules; under side of thighs covered with six or seven series of hexagonal plates, the anterior largest; twenty-one to twenty-two femoral pores on a side; ventral surface of tibia with three rows of plates, the preaxials three times as wide as the postaxials, first (preaxial) toe distinctly shorter than the fifth; forty-two scales around the tail at the fifteenth ring.

Ground-tone above and on the sides black, fading to olive on the neck; head chestnut-olive; sixteen rows of large blue spots extending from neck to groin, five rows of whitish spots of the same size on the hind legs, numerous white spots on the tail; throat and abdomen rosy except where the blue spots encroach upon the periphery; collar, chest, and ventral surfaces of the forelegs black; ventral surface of the tail whitish, indistinctly spotted with brown.

Length, 287 mm. (tail reproduced); body, 116 mm.; arm, 44 mm.; leg, 83.5 mm.; head-length, 35 mm.; head-breadth, 19 mm.

***Ameiva beatensis*, new species**

DIAGNOSIS. Closely related to *Ameiva lineolata* Duméril and Bibron, with which it agrees in its small size, smooth oblique caudal scales, and conspicuously striped dorsum. Distinguished from that species by its different color pattern: only six white stripes in the occipital region, four of these stripes continued to the tip of the snout; appendages and tail much bluer. Adult specimens larger than adult *A.*

¹This method of counting is that employed by Barbour and Noble, 1915, Bull. Mus. Comp. Zool., LIX, pp. 417-479, but not by some others.

lineolata, the outer row of ventral plates much larger than in that species; other less conspicuous differences in the larger anterior chin scales, somewhat different preanals and tibials. In some of these characters, such as the reduction in the number of stripes and the pattern continued to the tip of the snout, this species approaches *A. wetmorei* of Porto Rico.

TYPE.—A. M. N. H. No. 24328; adult male; Beata Island, Dominican Republic; October 3, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Nostril between two nasals; anterior nasals broadly in contact behind rostral; fronto-nasal broader than long, in contact with the loreal; supraoculars four; frontal in contact with the first three supraoculars; a pair of small fronto-parietals broadly in contact with the third supraocular; five large occipitals and two smaller post-occipitals; the median occipital approximately the same size as the two adjacent ones; two outer occipitals of each side separated from the supraoculars by a row of small scales; seven supraciliaries, the first largest and in contact with the loreal; supraciliaries separated from the supraoculars by a single row of small scales; five supralabials to the middle of the eye, the first in contact with the nasals only; five infralabials to the middle of the eye; a mental, a postmental and five pairs of large chin shields, the first pair fully in contact, the second pair in contact for about one-third their length; between chin shields and infralabials a row of small scales extending as far forward as the loreal; chin and throat covered with small scales, those on the anterior half of the throat twice as large as those on the posterior half; collar with five rows of enlarged scales, the scales of the three medial rows nearly twice as large as the largest throat scales.

Back, sides, and upper surfaces of the limbs covered with numerous small roundish scales, some of these angular, subhexagonal; the medial scales no larger than those immediately adjacent to them; ventral side of the body with eight longitudinal rows of scales and an outer incomplete row; the largest scales of this outer row having one-third to half the area of the abdominal scutes adjacent to them; abdominal scales forming thirty-four transverse rows; preanal plates in a transverse and a longitudinal row, the three medial scales much the largest and forming a triangle, the anterior of these three scales much larger than the two posterior ones; on the lower arm two rows of antebrachials of which the outer is enormous, at least three times as broad as the inner row; on the upper arm two rows of brachials, the anterior series three times as broad as the posterior; brachials and antebrachials forming a continuous series, not interrupted by small scales. Under side of the thigh covered with six rows of scales, the postaxial much smaller than the preaxial, but grading into the latter; fifteen or sixteen femoral pores to each femur; tibial shields in three rows, the second or larger postaxial series from one-third to one-half the size of the enormous scales in the first (preaxial) series; first (preaxial) toe extending not quite as far as the fifth (postaxial) one; scales of the tail smooth, oblique except for the medial series above and below, these median scales wedge-shaped; eighteen scales in the fifteenth ring from the base of the tail.

Ground-tone (in alcohol) jet-black above with a series of narrow white stripes extending from the extreme tip of the snout to about half the length of the tail; nine of these stripes in the pelvic region (not counting the white flanks), these converging anteriorly to form only six across the occiput and sides of the head, and only three anterior to the eye on the top of the head; the medial stripe of the pelvic region disappears at a point not one-third the distance to the anterior legs; the two adjacent

stripes converge just behind the shoulders to form a single stripe, and this stripe disappears just anterior to the shoulders; the two stripes adjacent to this median stripe of the shoulder region converge just anterior to the frontal plate, while the two outer stripes of either side extend to the tip of the snout; ventral surfaces white, tinged with blue; tail and appendages tinged both above and below with bright ultramarine blue.

Length, 177 mm.; body, 57 mm.; arm, 19 mm.; leg, 37 mm.; head-length, 15 mm.; head-breadth, 8.5 mm.

***Anolis longitibialis*, new species**

DIAGNOSIS.—Closely allied to *Anolis cybotes* Cope, from which it differs in its much longer hind limb; its larger dorsal scales; its double series of enlarged medial scales; its supraorbitals separated from the supraorbital semicircular. Its coloration alone is distinctive; the fine penciling of dark brown not found in *A. cybotes*, nor the bright dewlap (which, oddly enough, sometimes retains its color in preservative).

TYPE.—A. M. N. H. No. 24329; adult male; Beata Island, Dominican Republic; October 3, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Habit slender; body slightly compressed; head large with sharp canthus; snout broad but not depressed; tibio-tarsal articulation reaching nearly to the ear opening; tail compressed with a dorsal keel of short, pointed, backwardly directed scales; a low nuchal crest.

Head scales mostly smooth, some faintly keeled; four sharply edged canthal scales (not including the first long scale over the eye); one plate of the broad supra-orbital semicircles of each side in contact, the other plates separated from their mates of the opposite side by a single row of small scales; supraorbital semicircle separated from the occipital plate by one or two rows of scales; separated from the supraorbitals by one row of small scales. Occipital plate small; about as large as the ear opening; scales of the frontal region small, about as large as supraorbitals; frontal ridge faint; nine enlarged supraorbitals, all distinctly keeled; two rows of scales under the orbit parallel to the labials; five rows between canthal scales and labials at the widest point of the loreal region; six upper and six lower labials to the mid-point of the eye.

Dorsal scales small but larger than in *A. cybotes*; about one-fourth as large as the ventrals, which are smooth or swollen but not keeled, two rows of enlarged scales extending from occiput to caudal crest; a small, but well-defined, fleshy nuchal fold; tail with keeled scales and a low crest; seventeen scales around the tail at its mid-point; two enlarged postanals and one smaller one on either side. Limbs covered with enlarged scales on their postaxial sides, except on the tibia where the enlarged scales cover the ventral surface; a large dewlap extending posteriorly beyond the coracoid region.

Color (in alcohol) pale chocolate-brown above, finely marked with a number of narrow lines of dark brown; of these fine lines, the most conspicuous are one across the occiput, one behind the eye, and several short but longitudinally directed ones on the sides of the body; two or three transverse bars cross the back, the most anterior of which is widened out into a blotch; the dark tone forms about ten ill-defined rings on the tail; ventral surface dirty white, the throat region dusky; expanded dewlap yellowish.

Length, 198 mm.; body, 66 mm.; arm, 33 mm.; leg, 56 mm.; head-length, 23 mm.; head-breadth, 14 mm.

***Leiocephalus beatanus*, new species**

DIAGNOSIS.—Very closely allied to *Leiocephalus barahonensis* Schmidt, from which it differs only slightly in scutation. It possesses one less supraocular than that species, and the medial shields of the snout are proportionately larger, making contacts between the adjacent plates different than those found in *L. barahonensis*. Very different from *L. barahonensis* in its large size and coloration; color pattern somewhat the same in both species, except for the striping; young, unlike the immature *L. barahonensis*, are brown above with four longitudinal stripes of white in addition to the one on the lower flanks, older specimens become iridescent green above and the two median stripes disappear; the bright reddish tail and hind limbs, as well as the cross-banded, not mottled throat, are equally distinctive features; the bright yellow abdomen of the adult male is not found in *L. barahonensis*.

TYPE.—A. M. N. H. No. 24330; adult male; Beata Island, Dominican Republic; October 3, 1922; G. K. Noble.

DESCRIPTION OF TYPE.—Head shields large, ridged; on the crests of these ridges a series of fine sense pores; three scales between the rostral and the first supraocular; a pair of frontals, a pair of prefrontals, and a pair of supranasals embracing a medial series of three scales; the second medial very large and preventing the prefrontal from making contact with its mate of the opposite side, the anterior and posterior medial scales small; frontals and prefrontals separated from the canthal scales by an elongate rhomboidal scale; three supraorbitals on one side, four on the other; seven supraoculars on each side, the first very small; a small occipital bordered anteriorly by two narrow parietals; four parietals in all, the outer pair three times as broad as the inner pair; all head shields ridged; the supraoculars and parietals most distinctly; six to ten ridges on the larger scales; four upper and five lower labials to the middle of the eye. Dorsal and lateral scales sharply keeled, mucronate; ventral scales smooth with denticulated edge; about forty-one scales around the middle of the body; scales of the neck like the dorsals; scales behind ear keeled and imbricate, not granular; dorsal and caudal crests low.

Color (in alcohol) iridescent green above, with two pale dorso-lateral stripes becoming whitish in the shoulder and neck region, some indication of two additional pale stripes between these, but extending only half the length of the body; sides of the head and body below dorso-lateral stripe a dark brown, a whitish stripe on the lower part of the flanks extending from shoulder to groin; dorsal surface of the head dull brown; upper surfaces, sides, and ventral surfaces of posterior limbs and tail a reddish brown; this color much paler below than above. Ventral surface of throat and chest whitish or bluish, marked with seven irregular cross-bands of black or very dark brown; two of these bars broken, but the bars not divided into spots as in *L. barahonensis*; the first, second, and third bars continued on the sides of the head to form three vertical bars as in *L. barahonensis*, but better defined. Center of abdomen a brilliant yellow, sides of abdomen washed with grayish and studded with a series of azure blue spots; base of the thighs suffused with pinkish.

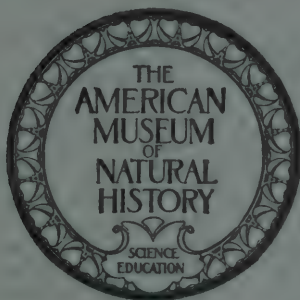
Length, 188 mm.; body, 76 mm.; arm, 27 mm.; leg, 57 mm.; head-length, 21 mm.; head-breadth, 15 mm.

AMERICAN MUSEUM NOVITATES

No. 65

A NEW WRASSE AND TWO NEW CICHLIDS FROM NORTHEAST AFRICA

By JOHN TREADWELL NICHOLS



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A NEW WRASSE AND TWO NEW CICHLIDS FROM NORTH-EAST AFRICA

By JOHN TREADWELL NICHOLS

In 1920 Mr. Barnum Brown made a small collection of marine fishes in Somaliland, and presented these, together with a few fresh-water fishes which he obtained in Abyssinia, to The American Museum of Natural History. Examination of this material shows it to be of considerable interest and to contain three species herewith described as new.

Tilapia browni,¹ new species

Scales, cycloid, 32. Gill-rakers, about 20 (17 on lower limb of first arch). Anal spines, 4. Pectoral, a little shorter than head. Dorsal XVII, 10; anal IV, 9. Mouth extending to anterior border of eye. Caudal truncate, with a few scales on the base only. Depth, 2.8. Eye, 4 in head.

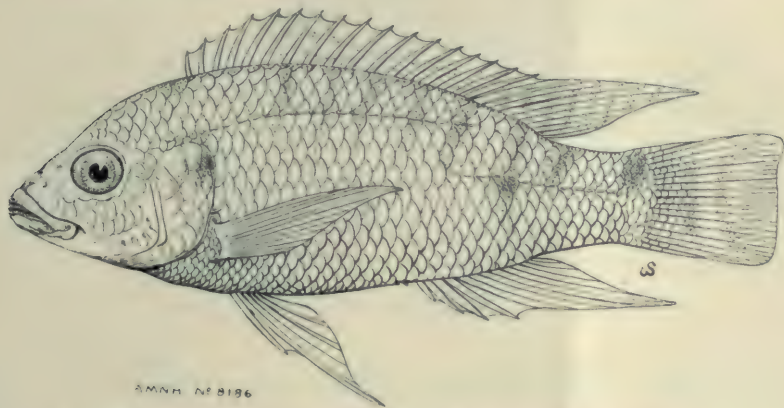


Fig. 1. *Tilapia browni*, type. 105 mm. to base of caudal.

The type, our only specimen, No. 8186, American Museum of Natural History, is from the Ramis River near Ganame, Harrar Province, Abyssinia, October 25, 1920, Barnum Brown. It measures 105 mm. to base of caudal. Depth, 2.8 in this length; head, 3.0. Eye, 4.0 in head; snout, 3.0; maxillary, 2.8; interorbital, 3.0; depth of peduncle, 2.3; 4th dorsal spine, 3.5; last, 2.4; longest dorsal ray, 1.1; last anal spine, 2.5; longest anal ray, 1.2; pectoral, 1.1; ventral, 1.1; caudal, 1.3.

The jaws are equal; mouth reaches anterior border of eye; peduncle is a little deeper than long. Pectoral narrow and pointed; ventrals, soft dorsal and anal

¹Named for the collector, Mr. Barnum Brown.

pointed, slightly filamentous. Teeth moderately broad, the outer row obliquely bicuspid, inner teeth tricuspid in 4 or 5 rows. Gill-rakers 3+17. Scales, cycloid, 32. Dorsal XVII, 10; anal IV, 9.

Color in alcohol, almost uniform. A faint dark blotch on opercular angle; two or three others on side; dorsal spotted with darker.

***Tilapia cancellata*,¹ new species**

Scales, cycloid. Gill-rakers, short, and numerous, about 20 to 25 on lower limb of first arch. Anal spines, 3. Pectoral, pointed, as long as head. Caudal, well scaled. Outer teeth, rather broad, irregularly bicuspid, inner cusp the larger; inner teeth, tricuspid in 3 or 4 rows. Three rows of scales on cheek. Peduncle, a trifle deeper than long. Caudal, slightly rounded, sharply barred with blackish. Dorsal XVI-XVII, 12-13; anal III, 10. Scales 32 to 34.

The type, No. 8187, American Museum of Natural History, is from the water-hole of a hippopotamus in the Abano River about 6 kilometers west of Addagalla, Abyssinia, collected by Barnum Brown. It measures 50 mm. to base of caudal. Depth, 2.7 in this length; head, 2.7. Eye, 3.5 in head; snout, 3.2; maxillary, 3.2; interorbital, 3.0; depth of peduncle, 2.7; 4th dorsal spine, 3.0; last, 2.5; longest

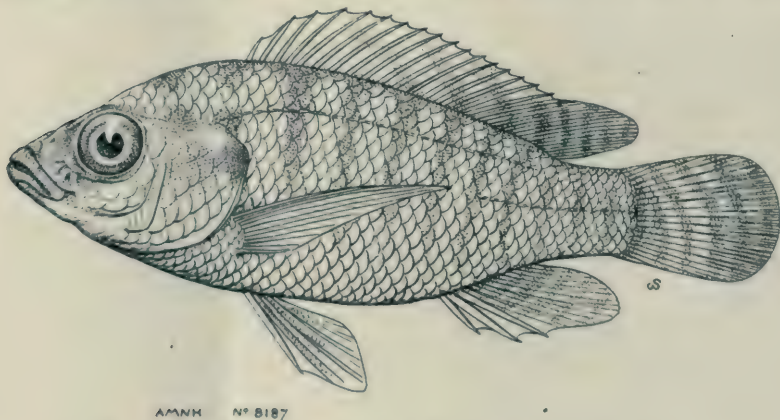


Fig. 2. *Tilapia cancellata*, type. 50 mm. to base of caudal.

dorsal ray, 1.8; last anal spine, 2.5; longest anal ray, 1.8; pectoral, 1.0; ventral, 1.5; caudal, about 1.6.

The jaws are equal; mouth does not reach vertical from anterior border of eye; peduncle is slightly deeper than long. Pectoral, narrow and pointed; ventrals, soft dorsal and anal blunt. Gill-rakers, 4+21. Scales, cycloid, 34; scattered scales on caudal, which is not quite perfect but appears to have been truncate or slightly rounded. Dorsal XIII, 12; anal, III, 10.

About nine narrow dark cross-bars on the sides. Soft dorsal and caudal sharply, and anal faintly barred. A dark blotch at angle of opercle.

¹*Cancellata*, barred.

A less perfect specimen of the same size and a very poorly preserved one, 145 mm. to base of caudal, have caudal rather thickly scaled, indicating that such scales have been lost in the type. The large one has the following proportions: Depth, 2.5; head, 2.5; eye, 4.3; snout, 3.2; interorbital, 2.6. Diagnosis of the species based on these three. Besides them, there are four smaller ones, all with the same data.

***Cheilinus lunifer*,¹ new species**

The type, our only specimen, No. 8185, American Museum of Natural History, Djibouti, French Somaliland, Barnum Brown collector, is 160 mm. long to base of caudal. Head, 2.6 in this (standard) length; depth, 2.4. Eye, 5.6 in head; snout, 3.3; maxillary, 3.1; interorbital, 4.0; last dorsal spine, 3.4; longest dorsal ray, 2.0; third anal spine, 2.7; longest anal ray, 1.8; depth of peduncle, 2.2; pectoral, 1.7; ventral, 1.6; caudal, 1.4. Dorsal rays IX, 11; anal III, 9. Scales, 21; in 8 or 9

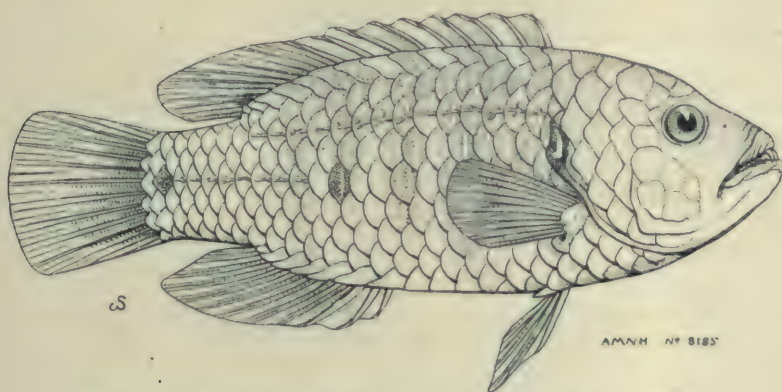


Fig. 3. *Cheilinus lunifer*, type. 160 mm. to base of caudal.

longitudinal series; upper (anterior) and lower (posterior) lateral lines not continuous, overlapping. Large scales on cheek opercle and nape forward to center of eye. Thence to snout, naked, as is lower jaw. Head and body, strongly compressed. Two strong canines above and below in the front of the jaws; none behind. Spinous dorsal, low. Soft dorsal and anal, moderately pointed, reaching base of caudal. Third anal spine the longest and strongest. Ventral, pointed, reaching slightly more than two-thirds distance to anal. Pectoral, rounded.

Color in alcohol, plumbeous, back and sides under the spinous dorsal irregularly darker in several ill-defined, dark cross-shades, each scale with a narrow vertical pale central streak, and numerous scattered pale specks. Peduncular region, pale. A black blotch in the center of the side under the last dorsal spine and a smaller black

¹*Lunifer*, in reference to the pale mark on the opercular flap as in *C. lunulatus* (Forsk.).

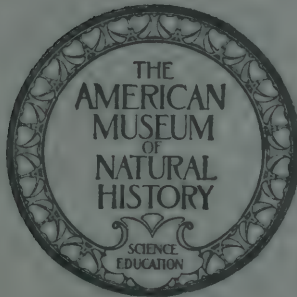
spot at the base of the caudal occupying most of the last lateral line scale; opercular flap, conspicuously black with a vertical somewhat crescent-shaped white bar. Spinous dorsal and entire anal, dark, vaguely mottled; soft dorsal, pale, a dark spot on the base of the eighth and ninth rays. Caudal, pale greenish, upper and lower edges white, posterior three-fifths somewhat dusky on the membranes. Pectorals colorless. Ventrals green.

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AMERICAN MUSEUM NOVITATES

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TWO NOCTURNAL BEES AND A MINUTE
PERDITA

By T. D. A. COCKERELL



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TWO NOCTURNAL BEES AND A MINUTE *PERDITA*

By T. D. A. COCKERELL

The bees described below were received from Dr. J. Bequaert, to whom I am greatly indebted for the opportunity to examine and describe such unusual and interesting forms. The types will be placed in the American Museum.

Megalopta (*Megaloptella*) *vigilans*, new species

Figure 5

♂.—Length about 11 mm., anterior wing, 8.4 mm. Rufotestaceous, the head and thorax strongly suffused with yellowish green; apical half of flagellum dusky; wings dusky. Very like *M. idalia* Smith (specimen from Manãos, Brazil, compared), at first sight appearing identical, but clearly separable by the following characters: face not bicolored; the clypeus and supraclypeal area (which is conspicuously narrower than in *idalia*) testaceous, strongly suffused with golden green; lateral margins of front (along emargination of eyes) brilliant rosy-purple; third antennal joint shorter (about as broad as long); first recurrent nervure joining second submarginal cell before end; scutellum shorter; third ventral segment of abdomen strongly and narrowly emarginate, and with a very fine raised median line running its whole length. By the structure of the third ventral segment this approaches *M. ægis* Vachal from Brazil and *M. athautis* Vachal from Peru.

Exact locality unknown. The unique specimen was collected by Mr. Austin Curtis at one of the harbors of the Caribbean Sea, perhaps on the coast of Venezuela.

Megalopta has been found as far north as Mexico (*M. tabescens* Cockerell); it has not been reported from the West Indies. *Megaloptella* Schrottky, to include the group of *M. idalia*, is certainly a valid subgenus.

XEROPHASMA, new genus (Panurgidæ)

Pale nocturnal bees, with immense ocelli; compound eyes large, inner orbits approximately parallel, facial quadrangle much longer than wide; thorax thinly hairy. Abdomen rather broad, with little hair except at apex. Legs thinly hairy. Wings ample, with very large stigma; lower section of basal nervure strongly arched, falling a considerable distance short of the nervulus; marginal cell moderately elongate, broadly and squarely truncate, forming an angle with the costa a little less than a right angle; three cubital cells, the first very long, much longer than the others combined; second small and triangular, petiolate above, receiving the first recurrent nervure a short distance before its end; third large and subquadrate, broader below than above, receiving the second recurrent nervure at its extreme end, meeting the

outer intercubitus; other features of venation, and hind wings, as in *Perdita*. Female with mandible straight and simple; facial foveæ linear, but short; a Y-shaped carina on front, the anterior ocellus between the forks; claws with an inner denticle; pulvilli very large. I have not ventured to extract the mouth-parts of the unique type.

TYPE.—*X. bequaerti*.

***Xerophasma bequaerti*, new species**

Figures 1 and 2

♀.—Length about 10.5 mm. Light testaceous, without dark markings, but eyes dark; flagellum rufescent apically. Wings clear hyaline; stigma pale clear ferruginous, lighter in middle; nervures very pale, reddish. Mesothorax with four longitudinal grayish-pellucid stripes, and a faint median one; base of metathorax large, dullish. Abdomen moderately shining, with obscure reddish subapical bands, and on the fifth segment a pair of spots. Hind tibiae long and slender; hind basitarsi somewhat longer than the remaining joints together.

Fabens, El Paso Co., Texas (about 30 miles southeast of El Paso, in the valley of the Rio Grande); taken at light, about 10 p.m., July 9, 1917; (J. Bequaert).

This is a most extraordinary bee, closely related to *Perdita*, but with the gigantic ocelli of the halictine *Megalopta* and a small second submarginal cell. Large ocelli have developed in nocturnal Mutillidae and various groups of bees, evidently quite independently. The testaceous color is also characteristic of these nocturnal insects, no less in the present insect than in the great *Xylocopa tranquebarica* (Fabricius) of India, which Bingham says "is crepuscular; on fine moonlight nights its loud buzzing can often be heard all night long." On the whole, however, *Xerophasma* is the most extreme of the nocturnal bees yet discovered.

It is an interesting question whether *Xerophasma* diverged from the ancestral stem of *Perdita* before the second submarginal cell had been lost, or whether the small second cell is a later development. I strongly incline to the latter view, and it is possible that the nervures bounding it are not the two intercubitals of ancestral bees, but one intercubital which has become split to admit the small cell. In any event, *Xerophasma*, which is undoubtedly allied to *Perdita*, shows us how striking characters may arise independently in different series and illustrates the possibility of artificial classifications based on such characters.

In describing *Perdita bradleyi*, Viereck states that in a specimen before him "the left wing has three submarginal cells by virtue of the first transverse cubitus forking near its base where it joins the cubitus. In the right wing there are but the normal (for this genus) two submarginal cells." In describing *P. novaeangliae*, he leaves us to suppose that the venation is quite normal for the genus; but in 1917 he erects for

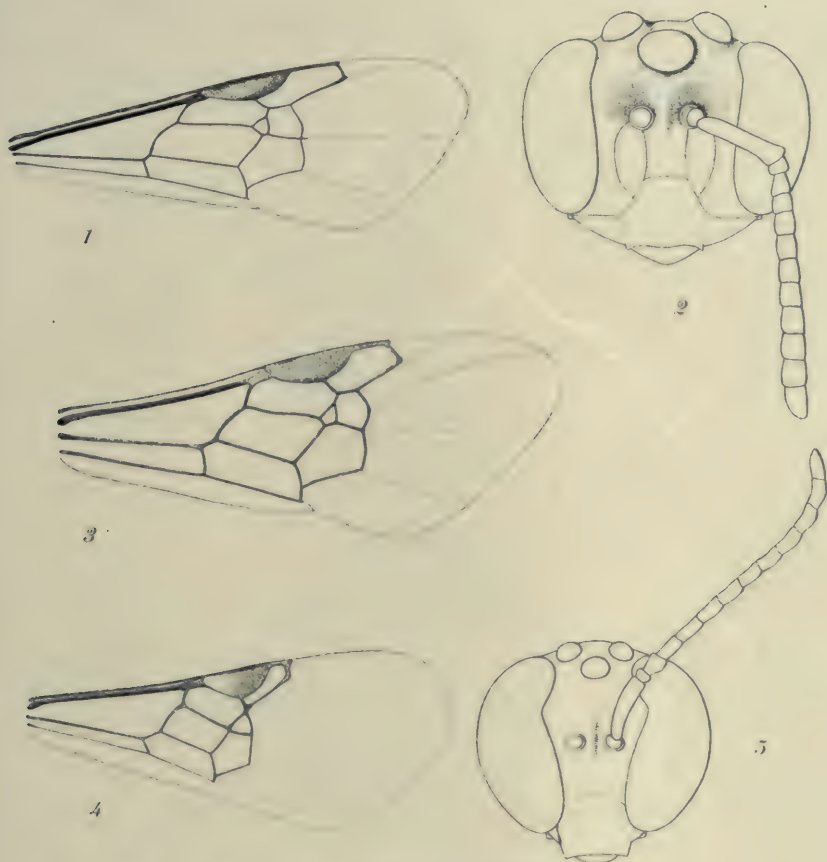


Fig. 1. Forewing of *Xerophasma bequaerti*, ♀.
 Fig. 2. Head of *Xerophasma bequaerti*.
 Fig. 3. Forewing of *Alloperdita novæangliæ* Viereck.
 Fig. 4. Forewing of *Perdita minima*.
 Fig. 5. Head of *Megalopta vigilans*, ♂.

it a subgenus *Alloperdita* and states that there are three submarginal cells. Thus it would seem that *Xerophasma* might be allied to *Alloperdita*, but this is not necessarily the case.¹

The scanty or thin hair on the legs of *Xerophasma* might suggest that it was parasitic, but I feel confident that this is not the case. Species

¹Robertson (1922, *Psyche*, p. 159) thinks that in *Perdita* the original first and second intercubiti or transverse cubitals have united, and according to this view they are partly separated in *Xerophasma*, the small cell being the genuine second cubital.

of *Perdita* with thinly haired legs can, nevertheless, carry very large loads of pollen.

***Perdita minima*, new species**

Figure 4

♀.—Length about or not quite 3 mm. Head and thorax shining rufotestaceous, without dark markings, except that the metathorax is dark brown dorsally; scape pale reddish, flagellum dark brown; legs brown, pallid basally. Wings hyaline; stigma dilute sepia; nervures pale but not colorless. Abdomen highly polished, dark red-brown above and below, without bands. Head normal, circular seen from the front, face very wide, cheeks unarmed; clypeus rather high. The following features were seen under the compound microscope: sides of face coarsely reticulate, the small areas transversely wrinkled, front very finely reticulate; eyes with green and pinkish tints; hair of head and thorax very scanty, mainly on lower part of mesopleura; marginal cell very short, the substigmatal part almost or quite twice as long as post-stigmatal; second submarginal cell small, triangular, slightly petiolate above, the recurrent nervures meeting the intercubitals; abdomen very minutely transversely lineolate; pygidial plate narrow, very minutely reticulate, with a beaded effect; claws without a subapical tooth. The abdomen is not uniformly darkened, and the dark color appears to depend largely upon its contents.

Tempe, Arizona; July 30–August 6, 1917; (J. Bequaert). Taken at flowers of *Euphorbia serpyllifolia* Persoon. Type in American Museum, one specimen in the author's collection, and one will be sent to U. S. Nat. Museum. Others were collected by Professor Bradley at the same time and are in the collection at Cornell University.

This minute reddish *Perdita* is very distinct; it reminds us of *P. (Perditella) larreae* Cockerell from New Mexico, which has similar venation, but is larger and the cheeks are armed. *P. larreae* visits *Covillea*.

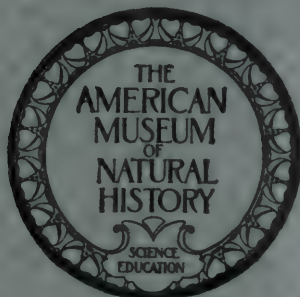
P. minima is not the smallest known bee, as *Trigona duckei* Friese, from Brazil, is only 2 mm. long.

AMERICAN MUSEUM NOVITATES

No. 67

DESCRIPTIONS OF PROPOSED NEW BIRDS FROM PANAMA, VENEZUELA, ECUA- DOR, PERU AND BOLIVIA

BY FRANK M. CHAPMAN



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DESCRIPTIONS OF PROPOSED NEW BIRDS FROM PANAMA, VENEZUELA, ECUADOR, PERU AND BOLIVIA

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Chiefly as by-products of continued study of our collections from Ecuador, descriptions are presented herewith of proposed new species and subspecies from Panama (1), Venezuela (1), Ecuador (4), Peru (5), and Bolivia (1). The author would greatly appreciate any comments from his colleagues which would tend to throw additional light on the status of the forms here described.

Ciccaba albogularis meridensis, new subspecies

SUBSPECIFIC CHARACTERS.—Similar to *Ciccaba albogularis albogularis* Cassin, but crown and nape more heavily spotted, the spots larger and whiter and tending to form a nuchal band; ochraceous markings of the back and scapulars larger and more numerous; white spots on the underparts more pronounced, the spotted area extending to the abdomen.

TYPE.—No. 100,444, Amer. Mus. Nat. Hist.; ♀ ad.; Escorial (alt. 2300 m.), near Mérida, Venezuela; November 24, 1902; Gabaldon y Hijos.

SPECIMENS EXAMINED

Ciccaba albogularis meridensis.—VENEZUELA: Escorial, 1 ♂, 1 ♀; Culata, 1 ♂, 1 ♀.

Ciccaba albogularis albogularis.—"SOUTH AMERICA": the type. COLOMBIA: Choachi, 4; "Bogotá," 1; Sta. Elena, 1 ♀; Medellín, 1. ECUADOR: Mojanda Mts., 8400-9000 ft., 2 ♂, 1 ♀; "Ecuador," 2 ?

The extremes of variation in this species are shown by specimens from near Mérida on the one hand and from northern Ecuador on the other. In the former the development of white spots reaches its maximum, in the latter, its minimum. "Bogotá" specimens are intermediate but nearer the Ecuador birds, and comparison with Cassin's type, kindly loaned me by Dr. Stone, shows that it is to this more southern form the name *albogularis* belongs.

Chordeiles acutipennis æquatorialis, new subspecies

SUBSPECIFIC CHARACTERS.—Nearest *Chordeiles acutipennis pruinosis* (Tschudi) of western Peru. The male with the ochraceous markings, particularly in the scapulars, more pronounced; the female with the ochraceous markings everywhere more pronounced and deeper, especially in the crown, back, wing-coverts, throat and abdomen.

Differs from *C. a. acutipennis* (Boddaert) of the Guianas and westward in being grayer above, on the chest and usually the tail, and in having the ochraceous markings, especially in the wings, paler.

TYPE.—No. 166,733, Amer. Mus. Nat. Hist.; ♀ ad.; Duran, Prov. Guayas, Ecuador; July 6, 1920; Geo. K. Cherrie.

RANGE.—Tropical Zone of western Ecuador, chiefly Equatorial Arid Fauna.

SPECIMENS EXAMINED

Chordeiles acutipennis aequatorialis.—ECUADOR: Esmeraldas, 2 ♂; Chone, 1 ♂, 1 ♀; Guayaquil, 1 ♀; Duran, 3 ♀; Puna Is., 1 ♀.

Chordeiles acutipennis pruinus.—WESTERN PERU: Chilaco to Cocachacra, 18 ♂, 14 ♀.

Chordeiles acutipennis acutipennis.—CAYENNE: 1 ♀. GUIANA: 1 ♂. BRAZIL: Bahia, 1 ♀. VENEZUELA: Maripa, 4 ♂, 1 ♀; Tucacas, 1 ♀. COLOMBIA: Lower Magdalena, 1 ♂, 1 ♀; Choco, 1 ♀; Cauca Valley, 1 ♀.

This is obviously an intermediate form between true *acutipennis* of Colombia and eastward to Cayenne and *acutipennis pruinus* of western Peru; and the region it inhabits is also a transition area between the humidity of western Colombia and the aridity of western Peru. There is, indeed, evident variation within the limits of Ecuador and, as the rainfall decreases from the north southward, so do specimens from Puna Island, when compared with those from Esmeraldas, show a distinct approach toward *pruinus*.

Systellura ruficervix atripunctata, new subspecies

SUBSPECIFIC CHARACTERS.—Most nearly related to *Systellura ruficervix ruficervix* (Selater) of the Temperate Zone of Venezuela, Colombia, and Ecuador, but paler and grayer; the female, especially, paler below; the sides of the head and antenuchal region with more hoary gray; most of the buffy ochraceous spots of the back and scapulars with black centers; under wing-coverts paler and less distinctly barred with black.

TYPE.—No. 168,932, Amer. Mus. Nat. Hist.; ♂; Acobamba (10,000 ft.), Prov. Junin, Peru; December 31, 1919; H. Watkins.

RANGE.—Temperate Zone of Peru.

SPECIMENS EXAMINED

Systellura ruficervix atripunctata.—PERU, Prov. Junin: Acobamba, 2 ♂; Maraynioc, 1 ♀; Rumicruz, 1 ♀.

Systellura ruficervix ruficervix.—ECUADOR: Salinas, Prov. del Oro, 1 ♂; Taragunacocha, Prov. del Oro, 1 ♂; Chimborazo, 2 ♂; above Gualea, 1 ♀; near Quito, 1 ♂. COLOMBIA: Tumaco, 1 ♀; Andes west of Popayan, 2 ♂; Laguneta, 1 ♂, 3 ♀; El Eden, 1 ♀; Tolima, 1 ♂; Sta. Elena, 1 ♂; La Sierra, 1 ♀; "Bogotá," 1 ♂. VENEZUELA: near Mérida, 3 ♂, 2 ♀, 1 juv.; Escorial, 1 ♂; Valle, 1 ♂.

Systellura decussata.—PERU: Moquegua, 1 ♂, 1 ♀; Ica, 1 ♀; Pisco, 1 ♀; Lima, 2 ♀; Huancayo, 3 ♂, 2 ♀; Viru, 1 ♀; Vitarte, 1 ♀; Trujillo, 2 ♀.

Systellura longirostris.—ARGENTINA: La Paz, east of Mendoza, 1 ♀. CHILE: Temuco, 1 ♀; Tofo, 1 ♀.

The bird here described was identified by Berlepsch and Stolzmann¹ (who had an immature male from Maraynioc) as *Stenopsis longirostris* (Bonaparte). The type of the latter was contained in a collection of birds from South America which included specimens of *Malacoptila torquata* (= "*Monasa fusca*" Bonaparte), *Muscipipra vetula* (= "*Muscicapra pullata*" Bonaparte) and other species either confined to, or characteristic of southeastern Brazil, indicating that the type of "*Caprimulgus longirostris*" came from that region.

Aside from the improbability that a form of this genus should be common to the Tropical Zone of southeastern Brazil and the Andean Temperate Zone of Peru, I have for comparison specimens from Argentina and Chile to which the name of *longirostris* is applied by authors generally and with far greater probability of correctness than is attached to Berlepsch's determination of his Maraynioc specimen as that species.

I am by no means certain, however, that the Argentine and Chilean birds are subspecifically identical. Our single Argentine specimen has the crown grayer and with much less black than in our two Chilean examples, while the buffy spots on the back and scapulars and wing-coverts are more evident. Should the Chilean be separable from the Argentine form it might be known as *Systellura longirostris bifasciata* (Gould). The relationships of these birds, however, obviously cannot be determined from three specimens. Meanwhile, assuming that the Argentine bird represents *longirostris*, that species differs from *atripunctata* in having the crown and prenuchal region brownish, not hoary gray, with the black markings more restricted and without conspicuous ochraceous bars; the ochraceous markings of the back and scapulars are paler and less pronounced (but those present in our single specimen have black centers as in *atripunctata*); the ochraceous markings of the wing-quills, particularly the secondaries, are paler, less numerous, and less strongly defined; the underparts are darker and the abdomen and under wing-coverts are more heavily barred. It is not unlikely that, like many other Andean Temperate Zone birds, the form we call *Systellura ruficervix* may have entered the Andes from the south and that the ancestral form is represented there today by the bird I have here called *longirostris*. It is more than probable that a series of specimens from Argentina to the Temperate Zone of Peru would show that *longirostris* and *atripunctata* intergrade, when *longirostris* would become the specific designation of the group.

¹1902, Proc. Zool. Soc., p. 30.

It is true that I have as yet no proof that *atripunctata* intergrades with *ruficervix ruficervix*. Their ranges are not continuous and they cannot, therefore, intergrade by physical contact. But in our series of twenty-five specimens of *ruficervix*, one from Tolima, near the northern end of the Central Andes, has black centers in many of the ochraceous spots of the scapulars and otherwise so nearly resembles *atripunctata* that the subspecific relation of the two can scarcely be doubted.

Systellura decussata (Tschudi), which, as vonBerlepsch and Stolzmann have shown,¹ was founded on a bird from Lima (and of which *æquicaudatus* Peale, based on a specimen from Callao, which I have examined, is a pure synonym), inhabits the coastal region of Peru from at least Moquegua to Trujillo. While evidently a representative of this group, it appears to be specifically distinct from any other known form of it. Specimens from Moquegua near the Chilean border show no approach to an example of *longirostris* from Tofo, sixty miles north of Coquimbo, indicating non-intergradation between the Chilean and Peruvian birds. *Systellura decussata* is the palest and smallest form of the group. In pattern of coloration it is intermediate between *ruficervix* and *longirostris* of Chile, the barred crown resembling that of the former, while in its unspotted back and scapulars it more nearly resembles the latter.

Setopagis anthonyi, new species

SPECIFIC CHARACTERS.—With a general resemblance to *Setopagis parvulus* but back and rump barred with black and ochraceous; wing-coverts tipped with ochraceous instead of whitish; inner vane of outer pair of rectrices entirely white, except along shaft on subapical half; five, instead of four outer primaries barred with white.

TYPE.—No. 166,785, Amer. Mus. Nat. Hist.; ♂; Portovelo, 2400 ft., Prov. del Oro, Ecuador; September 3, 1920; Anthony and Cherric.

DESCRIPTION OF TYPE.—Upperparts variously marked with browns, grays, ochraceous, and black; the crown centrally streaked with black; a poorly defined ochraceous-orange nuchal band; scapulars with velvety black marks bordered externally with ochraceous-buff; back and rump evenly barred with black and zinc-orange or rusty; outer pair of rectrices white on the inner vane, tips and base, the outer vane (except at the tip and base) with a narrow portion of the terminal half of the inner vane bordering the shaft, fuscous-black; succeeding pair largely black, lightly marked with ochraceous or buffy, chiefly marginally; the central pair grayish with some buffy markings and, along the shaft, black blotches which decrease in size toward the tips of the feathers; five outer primaries black without rusty markings and completely crossed by a white band 12 mm. in width along the shaft of the fifth (from without) primary; inner primaries and secondaries with ochraceous-buff

markings, the latter narrowly tipped with ochraceous-buff; wing-coverts mottled with grayish and ochraceous and tipped with large, rounded buff or ochraceous spots; longer under wing-coverts black unmarked, shorter ones ochraceous-buff, the edge of the wing black barred with orange-ochraceous; underparts light ochraceous-buff, the chin and breast thickly and finely barred with rusty and black; the throat white, the abdomen and lower tail-coverts with a few incomplete narrow blackish bars; tibiae bare for the lower half, the upper half with buffy feathers.

Wing, 135; tail, 96; tarsus, 15.5; exposed culmen, 11; width of bill at posterior margin of nostrils, 4.5 mm.

SPECIMENS EXAMINED

Setopagis anthonyi.—ECUADOR: Portovelo, the type.

Setopagis parvulus.—ARGENTINA, Prov. Salta: Embarcacion, 2 ♂, 1 ♀; Rosario de Lerma, 1 ♂. BRAZIL: Chapada, Matto Grosso, 1 ♂, 2 ♀.

The specimen on which this distinct species is based was shot at night by Mr. Harold E. Anthony, Associate Curator of Mammals in the American Museum, on a trail running through open, grassy, arid country near Portovelo. Mr. Anthony's capture of the type makes it doubly fitting that this new bird should receive his name in recognition of the contributions he is making to Ecuadorian zoögeography through an intensive study of the mammalia of that country.

Neomorphus salvini æquatorialis, new subspecies

SUBSPECIFIC CHARACTERS.—Similar to *Neomorphus salvini salvini* of Nicaragua, but pectoral band broader and complete, the crown less rufescent, Sacardo's umber rather than sayal-brown or tawny olive.

TYPE.—No. 156,781, Amer. Mus. Nat. Hist.; ♀ ad.; Huilca, alt. 4000 ft., eastern slope of Eastern Andes, west of Macas, Ecuador; H. E. Feyer.

SPECIMENS EXAMINED

Neomorphus salvini æquatorialis.—ECUADOR: Huilca, the type.

Neomorphus salvini salvini.—NICARAGUA: Peña Blanca, 2 ♂; Rio Tuma, 1 ♀; Savala, 1 ♂. PANAMA: Citaro, 1 ♂, 1 ♀; Tacarcuna, 1 ♀. COLOMBIA: Alto Bonito, 1500 ft., 2 ♀; Baudó, 3500 ft., 1 ♀.

Not one of our eleven specimens of *salvini salvini* has the breast-band as broad as it is in *æquatorialis*, nor in any of them is it complete. Specimens from eastern Panama agree in all respects with those from Nicaragua, but three from northeast Colombia, while possessing a narrow, broken pectoral band as in true *salvini*, approach *æquatorialis* in the color of the crown, which is less rufescent than in topotypical examples from Nicaragua.

The Buckley specimen recorded in the 'Catalogue of Birds of the British Museum' (1891, XIX, p. 417) from the Rio Cotopaza, Ecuador, should doubtless be referred to the form here described.

***Pyriglena pacifica*, new species**

SPECIFIC CHARACTERS.—Male not distinguishable in color from the other members of the *leuconota* group; female nearest in general coloration to the female of *Pyriglena leuconota maura* of western Brazil, but underparts grayish instead of ochraceous; white supraloral and superciliary stripe absent.

TYPE.—No. 173,290, Amer. Mus. Nat. Hist.; ♀ ad.; Puente de Chimbo, 1000 ft., Ecuador; August 2, 1922; Chapman and Cherrie.

DESCRIPTION OF MALE.—Uniformly jet-black; the feathers of the interscapulum snowy white for their basal half.

DESCRIPTION OF FEMALE.—Resembling the female of *Pyriglena leucoptera* but interscapulars basally white; upperparts nearly uniform Saccardo's umber, the rump dusky; tail black; wings externally and wing-coverts grayish buffy brown like the back, chin lighter; sides, and especially flanks, darker; under tail-coverts blackish; feet brownish black; maxilla blackish; mandible horn-color.

MEASUREMENTS OF MALES

Measurements of a series of birds from localities throughout the range of the group show a close agreement in size among forms of the Tropical Zone; the west Ecuador form, however, having a longer tail than birds from sea-level in eastern Brazil. With increased altitudinal range there is increase in size, the largest birds being those from the Subtropical Zone.

Name	Locality	No. Specimens	Wing	Tail
<i>P. leuconota leuconota</i>	Pará, Brazil	3	75-76.5	66-68
" " "	Cametá, Brazil	1	76	68
" " <i>maura</i>	Tapirapoan, Brazil	1	75	70
" " "	Urucum, Brazil	3	76-77.5	67-68
" " <i>hellmayri</i>	Vermejo, Bolivia	2	77-79	71-74
" " <i>marcapatensis</i>	Santo Domingo, Peru		78-82	75-77
" <i>picea</i>	Tulmayo, Peru		77.5-81	77-78.5
" <i>castanoptera</i>	Candela, Col.		78-79	79-82
" <i>pacifica</i>	Esmeraldas, Ec.	1	75	73
" "	Bucay, Ec.	1	75	73
" "	Rio Jubones, Ec.	1	79	71
" "	La Puente, Ec.	1	77	75
" "	Alamor, Ec.	1	75	75

SPECIMENS EXAMINED

Pyriglena pacifica.—ECUADOR: Esmeraldas, 4 ♂, 3 ♀; Naranjo, 5 ♂, 1 ♀; Bucay, 1 ♂, 1 ♀; Chimbo, 2 ♀; Rio Jubones, 1 ♂, 2 ♀; La Puente, 1 ♂; Portovelo, 1 ♀; Cebollal, 2 ♀; Alamor, 1 ♂.

Pyriglena leuconota leuconota.—BRAZIL: Pará, 1 ♂; Utinga, near Pará, 2 ♂, 2 ♀; Cametá, Rio Tocantins, 1 ♂.

Pyriglena leuconota maura.—BRAZIL, Matto Grosso: Tapirapoan, 1 ♂, 1 ♀; Urucum, 3 ♂, 2 ♀.

Pyriglena leuconota hellmayri.—BOLIVIA: Mapiri, 1 ♂; Vermejo, Santa Cruz, 2 ♂.

Pyriglena leuconota marcapatensis.—S. E. PERU: Santo Domingo, 1 ♂, 1 ♀; Rio Távora, 1 ♂, 1 ♀.

Pyriglena picea.—PERU, Prov. Junín: Tulumayo, 4000 ft., 3 ♂; Chelpe, 1 ♂, 1 ♀; Utcuyacu, 1 ♀.

Pyriglena castanoptera.—ECUADOR: Sabanilla, 5700 ft., Rio Zamora, 2 ♀. COLOMBIA: Andalucía, 3000 ft. E. Andes, 1 ♂, 1 ♀; Candela, 6500 ft., Cen. Andes, 6 ♂, 3 ♀.

SYNOPSIS OF GROUP

(FEMALES)

A.—Underparts ochraceous-buff to ochraceous-tawny.

1. *Pyriglena leuconota leuconota*.—Brazil, Pará region.
2. " " *maura*.—Brazil, Matto Grosso region.
3. " " *hellmayri*.—Bolivia, Yungas region.
4. " " *marcapatensis*.—S. E. Peru.

B.—Underparts grayish to buffy brown.

1. *Pyriglena pacifica*.—Tropical Zone, western Ecuador.

C.—Underparts wholly black.

1. *Pyriglena castanoptera*.—Subtropical Zone, eastern Ecuador, eastern Colombia and above headwaters of the Magdalena.

D.—Throat black; rest of underparts cinnamon-brown to Prout's brown.

1. *Pyriglena picea*.—Subtropical Zone, eastern Peru.

We have to thank Dr. Hellmayr¹ for removing the confusion which has so long existed in the nomenclature, characters, and distribution of the black-winged members of the genus *Pyriglena*. Our material and the specimens which I examined in the British Museum, when studying the relationships of the form here described, fully confirm Dr. Hellmayr's views in regard to the number of known forms in this group, but possibly a different conception of what constitutes a subspecies leads me to recognize four species where Dr. Hellmayr admitted but one.

The distribution and relationships of the group present some exceedingly puzzling features. In the first place, we have a group of four species, one of which is divisible into four races (or, according to Hellmayr, one species divisible into seven races) in which, aside from slight differences in size, the males are absolutely identical, while the females, in some instances, present striking differences. For example, in the east Ecuador form the female is black with cinnamon-brown back and wings, while in west Ecuador the upperparts and wings are nearly uniform Saccardo's umber, the underparts grayish buffy brown. Again, while from Pará to the base of the Andes in southeastern Peru, *P. leuconota* and its races are necessarily confined to the Tropical Zone; in south-

¹1919, Archiv für Naturg., LXXXV, (November 1920), p. 106, and 1921, Nov. Zool., XXVIII p. 201.

eastern Peru *P. leuconota marcapatensis* ascends to the Subtropical Zone¹ and thence northward through eastern Peru, eastern Ecuador, eastern Colombia and the mountains above the headwaters of the Magdalena, the group is known only from the Subtropics, but in western Ecuador it is found again in the Tropical Zone. These differences in zonal distribution must be taken into account when considering the probable relations of the forms in the group, for it is at once evident that, without regard to geographical proximity, the forms of the Tropical Zone more nearly resemble one another than they do the forms of the Subtropical Zone. That is, *P. pacifica* of western Ecuador is more like *P. leuconota leuconota* of northeastern Brazil than it is like *P. castanoptera* of eastern Ecuador.

If we were certain that no race of *leuconota* (as I restrict this name) occurred in the Tropical Zone from central Peru to Colombia, we might believe that *leuconota* had actually entered the Subtropical Zone where we last find it in southeastern Peru, and had in this zone, continued thence northward to Colombia, but had returned to the Tropical Zone in western Ecuador, reacquiring, at the same time, the characters of the Tropical Zone group.

Such theories, however, are warranted only after intensive collecting has definitely established not alone a bird's presence but the fact of its absence, and we are still a long way from this kind of knowledge in the region concerned.

***Oropezus rufula occabambæ*, new subspecies**

SUBSPECIFIC CHARACTERS.—Similar to *Oropezus rufula obscura* Berlepsch and Stolzmann of the humid Temperate Zone of east Central Peru, but general coloration brighter, the upperparts ochraceous tawny rather than cinnamon-brown; differs from average Colombian specimens of *O. rufula rufula* in being less rufescent, particularly below; bill shorter and stouter than in either *obscura* or *rufula*. Culmen, 17–18; depth at base, 5.5 mm.

TYPE.—No. 166,533, Amer. Mus. Nat. Hist.; ♂; Occabamba Valley, 9100 ft., Urubamba region, Peru; August 2, 1915; E. Heller.

SPECIMENS EXAMINED

Oropezus rufula occabambæ.—PERU: Occabamba Valley, 1 ♂; Machu Picchu, 1 ♀.

Oropezus rufula obscura.—PERU, Dept. Junin: Maraynioc, 1 ♂, 1 ♀; Rumicruz,

1 ♀.

Oropezus rufula rufula.—COLOMBIA: 11. ECUADOR: 21.

¹Possibly *P. l. hellmayri* also reaches the Subtropical Zone in Bolivia.

In my paper on the Birds of the Urubamba Valley,¹ lacking topotypical specimens of *Oropezus rufula obscura*, I referred specimens of the form here described to that race. The recent receipt of topotypes of *obscura* from Maraynioc shows that the Urubamba bird differs from it as described. In the paper referred to I commented on the variations shown by birds from Colombia and Ecuador. We have since acquired more examples from Ecuador, including two from eastern Ecuador, but I am as yet unable to distinguish more than one race from these two countries.

***Mionectes olivaceus fasciaticollis*, new subspecies**

SUBSPECIFIC CHARACTERS.—Resembling *Mionectes olivaceus galbinus* in the barring of the throat, but upperparts much darker, the breast and sides with more olive-green, less yellow; differing from *M. o. pallidus* in its more barred throat, much richer yellow underparts, greener and more uniformly colored upperparts, the crown not appreciably darker than the back.

TYPE.—No. 169,833, Amer. Mus. Nat. Hist.; ♀ ad.; Tulumayo, 4000 ft., Vitoe Valley, Prov. Junin, Peru: H. Watkins.

SPECIMENS EXAMINED

Mionectes olivaceus fasciaticollis.—PERU: Tulumayo, 5 ♀. ECUADOR: Zamora, 2000 ft., Prov. Loja, 2 ♂, 2 ♀.

Mionectes olivaceus pallidus.—COLOMBIA: Buena Vista, 4500 ft., above Villavieja, 1 ♂, 1 ♀ (the type).

Mionectes olivaceus galbinus.—COLOMBIA: Sta. Marta region, 9 ♂, 13 ♀.

This form inhabits the Tropical Zone of eastern Peru and eastern Ecuador from at least the Chanchamayo district north to Zamora, and probably the Amazonian Fauna of southeastern Colombia. Beyond this it is replaced by the quite different *M. o. pallidus*. The southern limits of its range are unknown. A female from La Pampa, near Santo Domingo in southeastern Peru, is very near the proposed new race but is slightly paler below and the throat is not so definitely barred. It thus approaches our two specimens of *M. o. pallidus* but is deeper yellow below and the crown is not darker than the back, as it is in *pallidus*.

An apparently adult female from the Rio Tavera, Peru (lat. 13° 25' S.; long. 70° 21' W.) is above the average in size (wing 70 mm.) and in its generally unstreaked underparts more nearly resembles *M. o. olivaceus* of Panama and Costa Rica than any other known member of the genus.

Altitudinally, *fasciaticollis* is represented in the Subtropical Zone by *Mionectes striaticollis poliocephalus* in Peru and by *M. s. columbianus* in eastern Ecuador. We have eight specimens of the former from Chilpes (7350 ft.) in the Vitoe Valley above Tulumayo, and one of the latter from Sabanilla (5700 ft.) on the Rio Zamora above Zamora.

¹1921, Bull. U. S. Nat. Mus., No. 117, p. 80.

***Myiarchus toddi*, new species**

SPECIFIC CHARACTERS.—Most nearly related to *Myiarchus phæocephalus* Sclater of western Ecuador and northwestern Peru, but back uniform gray; underparts (except breast) white tinted with sulphur-yellow.

TYPE.—No. 174,543, Amer. Mus. Nat. Hist.; ♂ ad. (fresh, unworn plumage); Palambla, 4000 ft., Prov. Piura, Peru; October 28, 1922; H. Watkins.

DESCRIPTION OF TYPE.—Forehead neutral gray, the feathers with blackish centers increasing in area posteriorly the hind-head becoming fuscous-black; back uniform neutral gray without trace of olive except for a very faint suggestion on the rump; upper tail-coverts gray, slightly darker than the back; tail fuscous, paler at the tip and with grayish edgings, the outer vane of the outer pair of feathers whitish, especially basally; wings fuscous black, external margins of primaries brownish gray, of secondaries, grayish white, the inner margins of both primaries and secondaries white with a slight suggestion of fulvous when seen from below; lower wing-coverts tinged with sulphur-yellow; upper wing-coverts margined with grayish; sides of the head clear gray much like the back; breast pale neutral gray, throat white; rest of underparts, including crissum, tinted with sulphur-yellow; tibiae grayish with an olive tint; feet and bill black. Wing, 95; tail, 91; tarsus, 24; culmen, 20.5 mm.

SPECIMENS EXAMINED

Myiarchus toddi.—PERU: Palambla, Prov. Piura, 1 ♂.

Myiarchus phæocephalus.—PERU: Paletillas, Prov. Piura, 1 ♂, 2 ♀; Chilaco, Prov. Piura, 1 ? ECUADOR: Esmeraldas to Santa Rosa, 13 ♂, 6 ♀, 5 ?

While we have but a single specimen of the birds here described, its strongly marked characters, in connection with our large series of *Myiarchus phæocephalus*, leave no doubt in my mind of its validity.

Myiarchus phæocephalus is a species of the Tropical Zone of which we have specimens from both Paletillas and Chilaco in Peru, the latter place some sixty miles northwest of the type-locality of *todd*i, while Mr. Todd¹ records additional examples from Perico on the Chinchipe and Bellavista on the Marañon, both localities in the Tropical Zone and some seventy miles east of Palambla. *Myiarchus toddi*, however, was taken in the Subtropical Zone and may, therefore, be a zonal representative of *phæocephalus*.

I have named this interesting new member of a genus to which he has devoted especial attention in honor of Mr. W. E. Clyde Todd, Curator of Birds of the Carnegie Museum of Pittsburgh, in recognition of his important contributions to our knowledge of tropical birds, so well signalized by the recent appearance of his monograph (in collaboration with M. A. Carriker, Jr.) on the birds of the Santa Marta region of Colombia.

¹1922, 'The South American Forms of *Myiarchus*,' Proc. Biol. Soc. Wash., XXXV, p. 209.

***Buarremon atricapillus tacarcunæ*, new subspecies¹**

SUBSPECIFIC CHARACTERS.—Similar to *Buarremon atricapillus atricapillus* (Lawrence) but with a gray postocular stripe and more or less developed gray vertical stripe, the bill thicker and averaging longer.

TYPE.—No. 136,268, Amer. Mus. Nat. Hist.; ♂ ad.; Mt. Tacarcuna, about 3500 ft., eastern Panama; March 24, 1915; W. B. Richardson.

RANGE.—Subtropical Zone, eastern Panama.

***Buarremon assimilis nigrifrons*, new subspecies¹**

SUBSPECIFIC CHARACTERS.—Similar to *Buarremon assimilis assimilis* (Boissonneau), but crown with gray areas smaller and black areas correspondingly larger, the gray median line not reaching to the forehead and sometimes nearly absent, the gray postocular usually less pronounced and sometimes almost wanting, when the black of the auriculars and nape is connected; wing and tail averaging shorter, the bill longer.

TYPE.—No. 172,533, Amer. Mus. Nat. Hist.; ♂ ad.; Las Pinas, 3600 ft., Alamor Mts., Prov. Loja, Ecuador; September 11, 1921; Cherric and Gill.

RANGE.—Subtropical Zone of southern Ecuador and doubtless northern Peru.

***Buarremon fimbriatus*, new species¹**

SPECIFIC CHARACTERS.—Resembling *Buarremon torquatus* (d'Orbigny and Lafresnaye) but back paler; tail olive-greenish, as in *B. phygas* of northeastern Venezuela; white superciliary stripe reaching the base of the bill; breast-band conspicuously margined with white or whitish; flanks and under tail-coverts paler; wings and tail averaging longer; bill shorter. Wing, 85–89; tail, 83–86; culmen, 16–17 mm.

TYPE.—No. 139,751, Amer. Mus. Nat. Hist.; ♂ ad.; Tujma, 8200 ft., near Mizque, Dept. Cochabamba, Bolivia; September 24, 1915; Miller and Boyle.

RANGE.—Known only from the type-locality.

***Hemispingus piurae*, new species**

SPECIFIC CHARACTERS.—Size of *Hemispingus castaneicollis*, but more nearly resembling *Hemispingus (Orospingus) garingi* in color, the crown black, the superciliaries broadly white, the underparts nearly uniform orange-ochraceous; back, however, as in *castaneicollis*, but tail grayish with no trace of brown.

TYPE.—No. 174,541, Amer. Mus. Nat. Hist.; ♂ ad.; Palambla, 4000 ft., Prov. Piura, western slope of Andes, east of Paita, Peru; October 25, 1922; H. Watkins.

DESCRIPTION OF TYPE.—Crown, cheeks and chin ink-black, a conspicuous white superciliary reaching from the base of the bill to the nape; lower margin of eye-ring white; nape and post-auricular region gray, forming a narrow band from one side of the breast to the other; back olivaceous gray; tail grayish fuscous, without trace of brown; wings slightly darker, both margined with olivaceous; underparts (except chin) nearly uniform ochraceous-orange, slightly paler on the center of the abdomen but with no evident demarcation between the colors of breast and abdomen, as in *castaneicollis*; feet brownish; bill black. Wing, 63; tail, 57; tarsus, 23; culmen, 13 mm.

¹The relationships of three forms of *Buarremon* here described are fully discussed in a paper on mutation in this genus, now in the printer's hands. Therein also is given a list of the specimens examined.

DESCRIPTION OF FEMALE.—Similar in color and in size to the male. Wing, 61; tail, 59; tarsus, 23; culmen, 13 mm.

SPECIMENS EXAMINED

Hemispingus piuræ.—PERU: Palambla, Dept. Piura, 1 ♂, 1 ♀.

Hemispingus castaneicollis berlepschi.—PERU: Chelpes, Prov. Junin, 1 ♂, 1 ♀.

Hemispingus castaneicollis castaneicollis.—PERU: Santo Domingo (Inca Mine), 5 ♂, 3 ♀. BOLIVIA, Dept. Cochabamba: Yungas, 1 ♂; Roquefalta, 1 ♀.

Hemispingus melanotis.—ECUADOR: East of Ambato, 1 ♀. COLOMBIA: Bogotá region, 1 ♂, 2 ♀, 2 ?; Santa Elena, 1 ♂, 1 ♀; Salento, 1 ♀.

Hemispingus (Orospingus) gæringi.—VENEZUELA: Mérida region, 3 ♂, 2 ♀.

While an obvious representative of the *castaneicollis-melanotis* group, this new form, reflecting its comparative isolation in the Western Andes of Peru, appears to have acquired characters which separate it specifically from its nearest allies. Its resemblance to *gæringi* is apparently to be attributed to parallelism of development, but the result emphasizes the relationship of that bird with the section of the genus *Hemispingus* to which *piuræ* belongs.

Synopsis of the *castaneicollis-melanotis* Group of the Genus *Hemispingus*

All inhabit the Subtropical Zone.

Crown jet-black; tail grayish.

Superciliaries conspicuously white; underparts nearly uniform. *H. piuræ* Chapman (Northwest Peru).

Crown gray or blackish gray; tail brownish.

Upper throat black; superciliary faint, chiefly postocular. *H. castaneicollis castaneicollis* (Sclater). (Southeastern Peru and Bolivia.)

Upper throat not black; superciliary absent or barely suggested.

Breast and erisum ochraceous-orange, very different from the ochraceous-buff abdomen. *H. castaneicollis berlepschi* (Taczanowski). (East Central Peru.)

Underparts nearly uniform ochraceous-buff, the breast slightly deeper. *H. melanotis* (Sclater). (Ecuador and Colombia.)

It will be seen that *berlepschi* is intermediate between *castaneicollis* and *melanotis*. Possibly a fully representative series would connect the Colombian and Bolivian forms. I have not seen specimens from western Ecuador, but it is evident that *ochraceus* Berlepsch and Taczanowski, described from Cayandeled, is very near *melanotis* and perhaps based on an immature female of it.

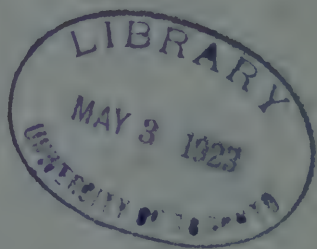
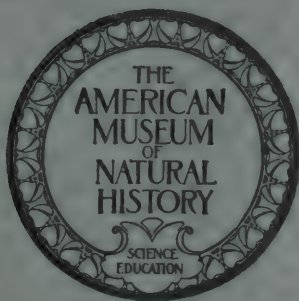
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AMERICAN MUSEUM NOVITATES

No. 68

A NEW GENUS AND SPECIES OF STAPHYLINIDÆ PARASITIC ON A SOUTH AMERICAN OPOSSUM

By HOWARD NOTMAN



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A NEW GENUS AND SPECIES OF STAPHYLINIDÆ PARASITIC ON A SOUTH AMERICAN OPOSSUM

BY HOWARD NOTMAN

The interesting beetle here described came into my hands through the kindness of Dr. Joseph Bequaert. It was found on the skin of a Brazilian opossum in the collection of the American Museum's department of mammalogy. Although closely related to the species of the genus *Amblyopinus* Solsky, both in form and habits, it cannot be placed in the subfamily Habrocerinæ with *Amblyopinus* because of the absence of elytral epipleuræ. Not only are the epipleuræ entirely indistinguishable but there is almost no lateral declivity. It thus becomes necessary to place this beetle in the subfamily Trichophyinae as defined by Ganglbauer (1895, 'Käfer Mitteleur,' II, Staphylinoidea 1, p. 16). No specimens of *Amblyopinus* are available to me for study but that genus is placed in the Habrocerinæ of Ganglbauer in the 'Coleopterorum Catalogus,' part 67, 1916, by Bernhauer and Schubert. The most noticeable point of resemblance between this beetle and *Amblyopinus jelskyi* Solsky, besides its general form, is the peculiar compressed, subserrate antennæ, with the terminal joint obliquely truncate. The form of the head and the position of the eyes differ, however, and the eyes, if such they are, are without trace of facets, which leads me to suppose the beetles may be blind. The proposed new genus may be separated from *Trichophya* as follows.

Eyes without facets, very small, placed at the posterior angles of the head. Elytra without lateral declivities. Antennal joints broad and compressed.

OMALOXENUS, new genus.

Eyes faceted, large, placed laterally. Elytra with strong lateral declivities. Antennal joints hair-like, verticillate. TRICOPHYA Mannerheim.

OMALOXENUS, new genus

GENOTYPE.—*Omaloxenus bequaerti*, new species.

Maxillary palpi 4-jointed; first joint rather small, second and third elongate, subequal in length, the third slightly larger, the fourth small, short, conical.

Labial palpi 3-jointed; first joint short, stout, second long, strongly incrassate apically, third smaller, more slender, conical.

Ligula not distinguishable from the paraglossæ, which are broad and membranous. Two prominent median setæ.

Mentum short, very transverse, subtruncate apically, with two long setæ. Labrum strongly bilobed, lobes rounded.

Antennæ compressed, scarcely at all incrassate; first joint stouter, second and third somewhat elongate and subequal, inserted at the base of the mandibles.

Eyes placed in the posterior angles of the head, without facets and possibly not functional; the covering submembranous.

Side of the head broadly and deeply grooved throughout, the antennæ being at the anterior extremity of the groove and the eyes at the other. The lower margin of the groove prominent and projecting.

Head trapezoidal, widest at the base, where it is strongly and abruptly constricted; a constriction also across the occiput separating the head from the neck. The posterior angles acute, prominent.

Sterna very short; coxæ large, anterior and intermediate contiguous, posterior triangular, without an outer lamella. Metasternum emarginate at apex.

Anterior tarsi strongly dilated and pilose beneath; intermediate feebly dilated and pilose; posterior elongate.

Elytra very short, without epipleuræ, scarcely inflexed.

Abdomen margined and densely pubescent.

Body fusiform.

***Omaloxenus bequaerti*,¹ new species**

Form rather broad, depressed and fusiform. Color rufo-testaceous; head with four minute black spots on the vertex, arranged in a trapezoid, the anterior pair more approximate, smaller and less distinct; thorax with a small black spot either side behind the middle and a black transverse line before the scutellum sometimes indistinct. Head and thorax glabrous, strongly shining; head rather coarsely and closely punctured; thorax very distinctly less coarsely and closely and more indistinctly punctured. Elytra rather densely pubescent, feebly shining; punctures rather fine and dense, subasperate. Abdomen more shining than the elytra; punctuation coarser, sparser and more asperate; pubescence coarser, more conspicuous posteriorly. Head with two setæ at the posterior angles; thorax with a lateral seta slightly before the middle and two basal setæ near the posterior angles; elytra with a lateral seta near the humerus; abdominal segments with several lateral setæ; all the setæ black. Head transverse, one-half wider than long and three-fourths the width of the thorax, base distinctly arcuate, triangular; antennæ reaching the base of the thorax, not incrassate; joints 4-11 oboeonic, about as broad as long. Thorax two-thirds wider than long, slightly wider than the elytra, widest behind the middle, sides arcuate, more strongly convergent anteriorly; all the angles rounded, base feebly bisinuate. Disk with two oblique cariniform tuberculations before the middle; an indistinct lateral tuberculation extending from the anterior angles as far as the middle; basal area with an indistinct tuberculation either side. Elytra very short and transverse, nearly three times broader than long; apex strongly emarginate, outer angles broadly rounded. Suture about one-third the length of the thorax. Abdomen narrower than the elytra; segments unimpressed, increasing regularly in length posteriorly. Eight dorsal segments visible, the seventh a third longer than the

¹Named in honor of my friend Dr. Joseph Bequaert.

preceding, the eighth deeply bimarginate, the median projection obtusely rounded at apex. Length, 5.5-6.75 mm.; width, 1.75 mm.

MALE.—Seventh dorsal abdominal segment with apex broadly rounded; seventh ventral with a triangular emargination as broad as deep and one-third the apical width of the segment; apex narrowly rounded.

FEMALE.—Seventh dorsal abdominal segment with a small oval emargination as broad as deep and about one-fifth the apical width of the segment, posterior to which the segment is slightly compresso-carinate; seventh ventral broadly subtruncate.

Type, ALLOTYPE, and PARATYPE.—Alto Itatiaya, Setto do Itatiaya, Brazil; E. G. Holt; found on a small Brazilian opossum, *Monodelphis*. Collection of The American Museum of Natural History.

Three paratypes with same label. Collection of the author.

*Amblyopinus*¹ *jelskyi* Solsky of the same size was taken on two species of Peruvian mice, and appeared to produce a diseased irritation of the skin with the loss of the hair. *Amblyopinus mnischechi* Solsky, 14 mm. in length, was taken on a species of Peruvian cavy or guinea pig.

¹1875, Hor. Soc. Ent. Ross., XI, p. 10, Pl. 1, fig. 3a-f.

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AMERICAN MUSEUM NOVITATES

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59.57,96(51)

CHINESE ANTS COLLECTED BY PROFESSOR S. F. LIGHT AND PROFESSOR A. P. JACOT¹

BY WILLIAM MORTON WHEELER

Professor S. F. Light of the University of Amoy and Professor A. P. Jacot of the Shantung Christian University have recently sent me for identification two small collections of Chinese ants. Professor Light's collection comprises well-known tropical species but is valuable because it is in great part from the Island of Hainan, from which, to my knowledge, no Formicidæ have previously been recorded. This collection yields no evidence that the ant-fauna of Hainan differs from that of the adjacent mainland. Professor Jacot's collection, from Shantung and the neighborhood of Peking, comprises palearctic forms, several of which are undescribed and of considerable interest in connection with the northern Eurasian fauna. As in my two previous papers on Chinese ants,² I list the various localities for future reference in determining the geographical range of the species.

Ponerinæ

Odontoponera transversa (F. Smith), ♀.—Five specimens from Tungan, Hainan Island (S. F. Light).

Diacamma rugosum (Le Guill.) subsp. **geometricum** (F. Smith) var. **anceps** Emery, ♀.—Four specimens from Kachek, Hainan Island (S. F. Light).

Euponera (*Trachymesopus*) **darwinii** (Forel) var. **indica** Emery, ♀.—One specimen from Kachek, Hainan Island (S. F. Light).

Pseudomyrmicinæ

Tetraponera rufonigra (Jerdon), ♀.—One specimen from Kachek, Hainan Island (S. F. Light).

Myrmiciniæ

Messor lobulifer Emery, ♀.—Eight specimens from Tsinan, Shantung, taken in a garden outside the city (A. P. Jacot).

¹Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 221.

²'Chinese Ants,' 1922, Bull. Mus. Comp. Zool., XLIV, pp. 529-547, and 'Chinese Ants Collected by Prof. C. W. Howard,' 1922, Psyche, XXVIII, pp. 110-115, 2 figs.

Crematogaster artifex Mayr, ♀.—Fifteen specimens from Kachek, Hainan Island (S. F. Light).

Pheidole rhomtinoda Mayr, ♂, ♀.—Six specimens from Tsinan, Shantung, under large stone in field (A. P. Jacot).

Pheidologeton diversus (Jerdon), ♂, ♀, ♂.—Many specimens from Kachek, Hainan Island and Amoy, Fukien Province (S. F. Light).

Solenopsis jacoti, new species

WORKER.—Length, 1.6–1.7 mm.

Allied to *S. fugax* Latreille but smaller. Head oblong, about one-fourth longer than broad, with straight, parallel sides and the posterior border distinctly emarginate in the middle. Mandibles with very oblique, 4-toothed apical borders. Clypeus projecting in the middle, with very slender, acute median teeth and strong carinæ; the lateral teeth very short but acute. Eyes very small, flat, consisting of only 5 or 6 facets, situated at about twice their length from the insertions of the mandibles. Antennal scapes scarcely reaching beyond the middle of the distance between the eyes and posterior corners of the head. Antennal club very large, swollen, much longer than the remainder of the funiculus, the basal joint less than one-third as long as the apical, but longer than broad; first funicular joint as long as joints 2–5 together; joints 2–7 very small, distinctly broader than long but much narrower than the club and first joint. Thorax and pedicel similar to those of *fugax* but the pronotum is more convex in profile, the epinotum is distinctly shorter, more rounded and sloping and the mesoepinotal impression is distinctly more pronounced. Though the petiolar and postpetiolar nodes when seen from above are subequal as in *fugax*, the petiolar node is distinctly lower.

♂; Sculpture and pilosity similar to those of *fugax*, but the coarse piligerous punctures on the head are somewhat larger and more conspicuous and the pale, uneven, erect pilosity on the body is decidedly shorter, especially on the head and thorax.

Brownish yellow, with black eyes, clypeal and mandibular teeth and a broad, darker brown band across the dorsal surface of the first gastric segment.

Described from five specimens taken by Prof. Jacot at Tsingtao, Shantung, "from the under surface of a stone in woodlands."

This ant is certainly very closely related to the common *S. fugax* of Europe, but the antennal scapes and epinotum are shorter, the antennal clubs larger, the apical border of the mandibles and their teeth more oblique, the petiolar node lower, the pilosity shorter and the first gastric segment is in great part infuscated. Perhaps the form here described is the unknown worker of *S. soochowensis* Wheeler, which is based on female and male specimens.

Solenopsis jacoti subspecies **pekingensis**, new subspecies

WORKER.—Length, 1.4–1.5 mm.

Differing from the preceding in its smaller size, in the smaller eyes, which consist of only 3 or 4 facets, and in the color of the body, which is throughout whitish yellow,

without infuscated first gastric segment. The pilosity is also paler and more whitish. The nodes of the petiole and postpetiole, though subequal, are less transverse, the former being more conical and less compressed anteroposteriorly.

Six workers taken by Professor Jacot at Cháo Yang An, hills west of Peking, "from lower surface of stones."

Ruzsky has described a form of *S. fugax* as var. *kasaliensis* from the Aral Sea, with only two facets in the eyes and a shorter and more sloping epinotum than that of the typical *fugax*, but the variety measures 2 mm. and is therefore considerably larger than *pekingensis*.

Moncmorium minutum Mayr.—Seven males from Tsinan, Shantung, under stones in arroyo and many workers from Cháo Yang An, hills west of Peking, "rotten log in burial ground" (A. P. Jacot). These specimens evidently belong to the typical south European form of the species and not to the subsp. *carbonarium* F. Smith. The epinotum of the worker is rounded, without distinct base and declivity and the petiolar node is low. The color is black.

Moncmorium (Parholccmyrmex) gracillimum (F. Smith) var. **mayri** Forel, ♀, ♂.—Nine specimens from Hainan Island (S. F. Light).

Tetramorium cæspitum (Linnæus) subspecies **simileve** Ern. André
variety **jacoti**, new variety

WORKER.—Length, 2–2.3 mm.

Whole body shining, except the head above and especially the mandibles, which are merely lustrous. Upper surface of head with numerous fine, sharp and rather uniform longitudinal rugæ, the punctuation between which is very indistinct. Occiput and posterior corners of head smoother and very shining. Thorax more coarsely longitudinally rugose than the head and with punctate-reticulate interrugal spaces. Epinotal spines small, slender and acute. Petiole and postpetiole in great part very smooth and shining above, the latter very distinctly broader than the former. Gaster very smooth and shining.

Black or deep piceous, the thorax sometimes slightly paler than the head and gaster; mandibles, clypeus, cheeks, antennæ, legs and neck reddish brown, the femora, except their ends and in some specimens the scapes, darker, castaneous brown.

Described from numerous specimens taken by Professor Jacot in the Tartar City, Peking "from a paved court-yard."

I have not seen specimens of the typical *semileve* Ern. André, but it seems to be the only one of the numerous forms of *cæspitum* recognized by Emery (1909, Deutsch. Ent. Zeitschr., pp. 697–705) to which the Chinese form can be attached.

Meranoplus bicolor (Guérin), ♀.—Two specimens from Kachek, Hainan Island (S. F. Light).

Cataulacus granulatus (Latreille), ♀.—A single specimen from Kachek, Hainan Island (S. F. Light).

Strumigenys godeffroyi Mayr var. **lewisi** Cameron, ♀.—Eight specimens from Tsingtao, Shantung, from "leaf-mould, mostly pine-needles" (A. P. Jacot).

Dolichoderinæ

Tapinoma melanocephalum (Fabricius), ♀.—Two specimens from Kachek, Hainan Island (S. F. Light).

Technomyrmex albipes (F. Smith), ♂, ♀.—Tsingtao, Shantung, "from sweepings in low grass under pines," and Tsinan, Shantung, "under stone in field" (A. P. Jacot).

Formicinæ

Plagiolepis longipes (Jerdon), ♀.—Numerous specimens from Kachek, Hainan Island (S. F. Light).

Plagiolepis wroughtoni Forel, ♂.—Numerous specimens from Tsinan, Shantung, "under stones in field"; Tsingtao, Shantung, "in sweepings from low grass under pines"; Cháo Yang An, hills west of Peking, "attending Coccids on apricot trees" (A. P. Jacot).

Paratrechina (Nylanderia) bourbonica (Forel) subsp. **bengalensis** (Forel), ♂.—Three specimens from Kachek, Hainan Island (S. F. Light).

Formica rufibarbis Fabricius variety **orientalis**, new variety

WORKER.—Length, 5-5.5 mm.

Differing from the typical European form of the species in the smaller size and in the following characters: the pubescence, especially on the gaster is distinctly longer, denser and more silky, the erect hairs on the front, pro- and mesonotum are more numerous, stouter and less acute, and the infuscated areas on the pro- and mesonotum are more extensive.

Nine workers taken by Professor Jacot on the sand-flats west of Nu Ku Kow, Kiachou Bay, Tsingtao, Shantung.

This variety is close to the variety *glauca* Ruzsky of Southern Russia and Western Siberia, but Emery states that this form has the same pilosity as the typical *rufibarbis*. The variety *subpilosa* Ruzsky, with the same distribution as *glauca*, is more pilose than *orientalis* and the coloration of the head and thorax is much paler.

Formica (Proformica) jacoti, new species

WORKER.—Length, 3-5 mm.

Head, even of the largest workers, longer than broad, subrectangular, nearly as broad in front as behind, with straight, subparallel cheeks, rounded posterior corners

and feebly convex posterior border. Cheeks about one and one-half times as long as the eyes. Clypeus moderately convex, carinate, its anterior border entire, broadly rounded. Mandibles apparently 6-toothed, the apical teeth much larger than the basal. Frontal carinae very short, parallel; frontal area indistinct. Antennal scapes extending nearly half their length beyond the posterior corners of the head in the smaller and about two-fifths their length in the larger workers; first funicular joint as long as the two succeeding, subequal joints together. Thorax rather robust, in profile with shallow mesoepinotal constriction, the outline of the mesonotum straight, gently sloping, continuing the straight outline of the posterior portion of the pronotum; epinotum somewhat longer than broad, the base somewhat longer than the declivity with which it forms a rounded obtuse angle. Petiole rather narrow, with straight, subparallel sides and distinctly emarginate, blunt superior border; in profile nearly as thick above as below, flattened behind, more convex above anteriorly. Gaster rather large; legs moderately long.

Mandibles opaque, evenly, finely and sharply longitudinally striated. Surface of body shining, densely and distinctly shagreened, the head finely and densely punctate.

Hairs and pubescence silvery, whitish; the pubescence rather long and dense but not completely concealing the sculpture, giving the whole surface a pruinose appearance. Erect hairs sparse, almost absent, except on the clypeus and terminal gastric segments. Flexor surfaces of femora and tibiae with a few short, widely separated bristles. Gula without erect hairs.

Dark piceous brown, with bright bronzy reflections. Anterior portion of head, posterior portion of pronotum, mesonotum and pleurae somewhat reddish brown. Mandibles, antennae, except the last funicular joints, legs, except the coxae and middle portions of the femora, brownish yellow. Palpi fuscous.

Described from three large and six smaller workers taken by Professor Jacot at Cháo Yang An, western hills of Peking, "from a nest under a stone in a field."

The only other *Proformica* known from Eastern Asia is *mongolica* Emery, described from a few specimens taken at Chara-Gol, Mongolia. This form, however, judging from Emery's description and figure (1909, Deutsch. Ent. Zeitschr., p. 202, fig. 12), has a broader head and much shorter antennal scapes, and the pubescence is described as "sparse," like that of *nasuta* Nylander. *P. jacoti* is certainly quite distinct from *nasuta* and the other known species of the subgenus.

***Camponotus herculeanus* (Linnæus) subsp. *japonicus* Mayr var. *aterrimus* Emery, ♀.**—Thirteen specimens from Cháo Yang An, hills west of Peking (A. P. Jacot).

***Camponotus* (*Dinomyrmex*) *dorycus* (F. Smith) subsp. *carin* Emery, ♀.**—A single specimen from Kachek, Hainan Island (S. F. Light).

***Camponotus* (*Myrmothrix*) *nicobarensis* Mayr var. *exiguo-guttatus* Emery, ♀, ♀.**—Several specimens from Tungan and Kachek, Hainan Island (S. F. Light).

Camponotus (Myrmosericus) rufoglaucus (Jerdon) subsp. **paria** Emery, ♀.—One major and one minor worker from Kachek, Hainan Island (S. F. Light).

Polyrhachis (Myrmhopla) dives F. Smith, ♀, ♂.—Two males and several workers from Kachek, Hainan Island and Amoy, Fukien Province (S. F. Light).

Polyrhachis (Myrma) mayri Roger, ♀.—Two specimens from Kachek, Hainan Island (S. F. Light).

Polyrhachis (Cyrtomyrma) rastellata F. Smith subsp. **lævior** Roger var. **debilis** Emery, ♀.—A single specimen from Tungan, Hainan Island (S. F. Light).

AMERICAN MUSEUM NOVITATES

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59.78P

THE GENERIC AND GENETIC RELATIONS OF *PSEUDACRIS*, THE SWAMP TREE FROGS

By G. K. NOBLE

For some time it has been recognized that the Swamp Tree Frogs, *Pseudacris*, are badly in need of revision. Many of the species differ but slightly from others, while certain of the so-called diagnostic characters seem dependent on fixation.

In preparation for a revision of the genus, I found it necessary to re-examine the characters upon which the genus is based, for several of the species differ but slightly from *Hyla*. The work led to some interesting conclusions and, as this revision is now indefinitely delayed, it seems advisable to place these conclusions on record.

Although only seven species of *Pseudacris* were recognized in the Check List of Stejneger and Barbour (1917, pp. 30-31), at least two more seem valid from the material I have examined. These are *P. copii* and *P. verrucosus*. Of these nine species, by far the most distinct is the minute *P. ocularis* (Holbrook). I have examined no less than 390 specimens of this species and have been impressed by the fact that it exhibits externally no character to distinguish it generically from the diminutive neotropical hylas, possessing reduced webs, as for example *H. chica* Noble (1918, p. 335) described from Nicaragua. If the reduced webbing is characteristic of some species of *Hyla*, what characters distinguish the species of *Pseudacris* and prevent our referring them also to the genus *Hyla*?

The characters utilized by Boulenger (1882, p. 332) to define that genus are certainly not diagnostic. *Pseudacris occidentalis* has as well-developed disks as many species of *Hyla*. Some semiterrestrial hylas of the neotropics do not possess any more expanded dilations than *P. feriarum*, and the digital disks of that species are scarcely larger than those of *P. nigrita*, the type of the genus.

The extent of the dilation of the sacral diapophyses does not distinguish *Pseudacris* from *Hyla*. One may convince oneself of this fact by comparing the sacrum of *H. crucifer* with those of a series of *Pseudacris*. Thus, I find that the sacral diapophyses of one specimen (A. M. N. H. No. 5743) of *P. septentrionalis* are a trifle more dilated than those of two

specimens of *H. crucifer* before me, while those of another specimen (A. M. N. H. No. 3004) of the same species are a trifle less so. The sacral diapophyses of a specimen of *P. ocularis* are about as extensive as those of *H. crucifer*. The sacrum of *H. chica* is not as dilated as any of the species of *Pseudacris* examined. I have (*loc. cit.*) discussed this species in the paper referred to above. The narrow sacral diapophyses are not always correlated with small size.

Cope (1889, p. 332) states that *Pseudacris* may be distinguished from the typical forms of *Hyla* by "the elongate terminal phalanges with small basal globe, supporting minute dilations, and the nearly webless digits. . . . Species of *Hyla* less representative are similar in cranial structure and have a diminished amount of palmation, but the series appears with our present knowledge distinct in the structure of the feet."

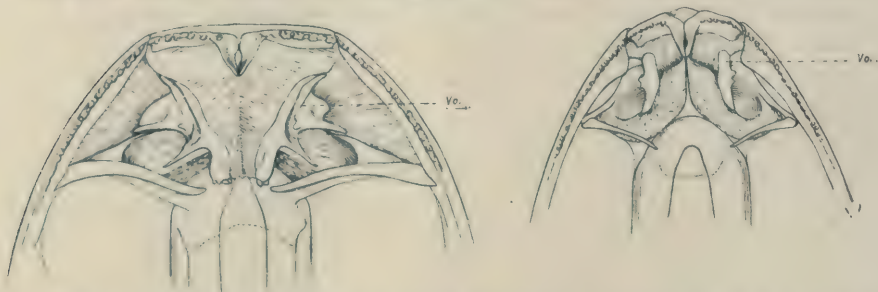


Fig. 1. Vomerine region with surrounding cranial elements in *Hyla crucifer* (left) and *Hyla ocularis* (right).

After a critical examination of the terminal phalanges of *P. septentrionalis* and *P. ocularis*, and comparisons of them with those of *H. crucifer*, *H. versicolor*, etc., I have convinced myself that there is no constant difference in the structure of these elements, although they all vary somewhat in size. (Fig. 3.) The intercalary cartilage differs somewhat in size in the various species, but, as this also differs in the digits of a single limb (Fig. 3), its size cannot be considered of great importance. The intercalary disk of *Acris* is proportionately longer than in any species of hylid which I have examined.

Pseudacris is stated in all textbooks to possess vomerine teeth, as in most species of the genus *Hyla*. Those species of *Hyla* which do not possess vomerine teeth are sometimes grouped together under the name *Hylella*. I have shown elsewhere (Noble, 1922) that genera based on the presence or absence of vomerine teeth are usually polyphyletic and artificial assemblages. Some specimens of *Hyla chica* lack the vomerine

teeth, while others possess them. It is therefore of no great phylogenetic consequence to find that, contrary to the statement of Holbrook (1842, p. 173) and Boulenger (1882, p. 333), *P. ocularis* normally lacks the vomerine teeth. I can find no evidence of them in the 390 specimens of this species before me. These specimens come from several localities in Lee Co., Florida (3 specimens); Arlington, Florida (49 specimens); near Jacksonville, Florida (336 specimens); Wilmington, South Carolina (1 specimen); and Hampton Co., South Carolina (1 specimen). Small specimens of *Hyla* often exhibit a reduction of the web between the toes and a loss of the vomerine teeth. *P. ocularis* exhibits both these features, as further evidence of its close relationship to *Hyla*.



Fig. 2. *Hyla ocularis* (Holbrook), typical color variation.

The reduction of the vomers has progressed farther in *P. ocularis* than in *H. chica*. It seems highly improbable that they could ever bear teeth. (Fig. 1.) I believe it will be shown that *P. ocularis* never exhibits vomerine teeth even as a variation.

P. ocularis has so many external characters in common with the small hylas that I have given a figure (Fig. 2) of a typical specimen. It will be noticed that the disks, although small, are as distinct as in many species of *Hyla*.

Many structural features of *P. ocularis* suggest that the species is more closely allied to *P. feriarum* and its close allies than to *Hyla*

squirella, *H. femoralis*, or any other of the small species of *Hyla*. The reduced web and the form of its pectoral girdle (Fig. 4) and hyoid apparatus suggest this, but, until the osteology of many more species of southern hylas is made known, the exact genetic relations of *P. ocularis* must remain uncertain. In external appearance *P. ocularis* is most hyla-like. Mr. Jay A. Weber, who observed the species in life and has presented his specimens to The American Museum of Natural History, remarks:



Fig. 3. Right foot of *H. ocularis* viewed laterally to show the form of the intercalary cartilages.



Fig. 4. Pectoral girdle of *H. ocularis*, ventral aspect (left) and sacrum of *H. ocularis*, dorsal aspect (right).

"The tiny frogs were a brilliant light green in life, similar to, but even brighter than *H. cinerea*. They were observed most abundantly at Rocky Lake. A narrow belt of reeds along the water's edge had been trampled down by cattle, and it was here the frogs, in association with *Acris*, were found. They were extremely agile and I found it impossible to get near enough to catch them by hand. As one approached them,

they would hop among the crushed, but still living, reeds, where their green coloration caused them to disappear immediately. Never did they seek a hiding place in the holes or shallow puddles in the manner of *Acris*. The deep water of the lake was full of fish and I noticed that neither *Acris* nor this species ever hopped into the deep water. At last, after constructing a club from the base of a cat-tail stalk, I succeeded in approaching close enough to secure some specimens. The species is the rarest of the riparian frogs in the region that I visited and its extreme agility and protective coloration make it the hardest, by far, to catch."

The huge series of 336 specimens of *P. ocularis*, all from the vicinity of Jacksonville and all taken within a few weeks' time, exhibits an extraordinary range of variation. In what may be called the "dark phase," preserved specimens possess three longitudinal stripes of dark brown on the back, very similar in form to *P. triseriata*. The ground tone, however, is flesh-color, and the black stripe on the side of the head readily distinguishes the species from other species of *Pseudacris*. The "light phase," that illustrated in Figure 2, is of more frequent occurrence, for the stripes in most specimens are indistinct.

Some species, at present referred to *Pseudacris*, are superficially more hyla-like than others. Perhaps the most hyla-like is *P. copii*. Future work may show that *P. septentrionalis*, *P. triseriata*, and *P. feriarum* are closely allied and possess characters in common, distinguishing them from the more hyla-like species of the genus. But it must be clearly recognized that neither the shape of the sacral diapophyses, the structure of the terminal phalanges, nor any other characters which have been suggested until this time are actually diagnostic of the genus. Until these characters have been pointed out, the genus *Pseudacris* must be disregarded and the species formerly referred to that genus must be referred to *Hyla*. In referring all the species of *Pseudacris* to *Hyla*, two changes in nomenclature are as necessary as they are unfortunate. The name *septentrionalis* is preoccupied by *Hyla septentrionalis* of Boulenger. As no other name seems available, I propose the name **Hyla canadensis** for that species. The name *H. copii* (Boulenger) is preoccupied by *H. copii* of Boulenger 1887, and I propose for it the name, **Hyla weberi**.

It will be maintained by some who are concerned only with North American herpetology that the name *Pseudacris* should be retained, if only to distinguish the American diminutive hylas. These workers may still use the name *Pseudacris* as a section or a group name, just as one often speaks of the "*Hylella* group" of *Hyla*.

SUMMARY

(1) No characters exist to distinguish *Pseudacris* from the short-webbed neotropical species of *Hyla*.

(2) *Pseudacris* has undergone an evolution parallel to this group of hylas.

(3) The species of *Pseudacris* must be referred to *Hyla*, although all species are distinguished from American hylas on external characters.

(4) In referring these species to *Hyla*, certain names are found to be preoccupied, and the following names have been proposed: *H. canadensis* for *P. septentrionalis*; *H. weberi* for *P. copii*.

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59.82(7)

DESCRIPTIONS OF APPARENTLY NEW BIRDS FROM NORTH AMERICA AND THE WEST INDIES

By LUDLOW GRISCOM

The following descriptions of apparently new species and subspecies of birds are based largely on material in the collection of Dr. L. C. Sanford or acquired by The American Museum of Natural History through his interest and support.

***Dendragapus obscurus munroi*, new subspecies**

SUBSPECIFIC CHARACTERS.—Similar to *Dendragapus obscurus fuliginosus* (Ridgway), but adult males uniformly much blacker above, especially on the back and rump; averaging blacker on the chest, and slightly more sooty on breast and abdomen; under tail-coverts with less gray vermiculation on the subterminal black area of each feather; feathers back of nostrils rich deep brown. Females much darker above, the black bars on the feathers averaging wider, the brown bars of a much deeper tint; back of neck brown, never grayish; rump almost devoid of gray edgings to the feathers; chest and flank feathers with their brown areas darker. Young males (first nuptial plumage) differing decidedly from males of similar age of *fuliginosus* in having the feathers of the head and a broad ring of feathers around the neck tinged with rusty brown, this brown ring below appearing between the whitish throat and black chest, and sharply demarcated.

TYPE.—No. 5321, collection of L. C. Sanford; ♂ ad.; Queen Charlotte Islands, British Columbia; June 21, 1914; W. W. Brown.

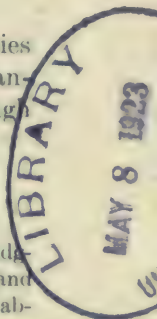
SPECIMENS EXAMINED

Dendragapus obscurus fuliginosus.—Alaska (Sitka), 2 ♂, 3 ♀; coast of British Columbia, 6 ♂, 1 ♀; Washington, 2 ♂, 1 ♀.

Dendragapus obscurus munroi.—Queen Charlotte Islands, 15 ♂, 14 ♀.

The existence of a distinct new form of the sooty grouse on the Queen Charlotte Islands has long been suspected, and its description has only awaited the arrival of thoroughly comparable material. I take pleasure in naming it after J. A. Munro, who has collected the finest series of this race in existence and who has added so much to our knowledge of British Columbian birds.

Too much care cannot be used when working with these birds to make proper allowances for seasonal variation in plumage. It is not too much to say that extreme color differences in either race, which are purely



seasonal, are as great as the subspecific characters given above to distinguish the two races in comparable plumages. Not only are there two moults each year and a considerable amount of wear, but year-old birds differ from both juvenals and adults, and there is considerable individual variation. Moreover, there is considerable individual irregularity in the moults, so that birds of the two races taken in the same month are not necessarily comparable.

Taking males first, the material available shows that first-winter birds are distinguishable from winter adults in having a variable but greater amount of rusty-brown vermiculation and barring on the back and to a more limited extent on the chest. The head feathers are also faintly tipped with dark brown. The outer webs of all but the outermost primary are extensively freckled with grayish brown. By April or early May wear has worn away the lighter tips of many of these feathers, giving a more solid color effect, especially noticeable on the back. The first nuptial plumage is attained in May or early June and affects the feathers of the head, neck, chin, and throat, and to a slight extent the upper back. It is in this plumage that the Queen Charlotte Island race acquires the brown feathers mentioned in the diagnosis. In *fuliginosus*, however, these parts are indistinguishable from those of adults. First-year birds can only be told by the freckling on the primaries and rusty vermiculations on the feathers of the back. The first postnuptial moult commences as early as July 10 or not until after August 20, and differences between young and old now vanish. The one possible exception is the freckling of the primaries, traces of which can be found in two specimens, which in every other way are old birds. The most deeply and richly colored birds are naturally the adults in fresh winter plumage. Wear is slight, and slow in producing any considerable effect, December specimens not being separable from late August specimens. Suffice it to add that, in addition to the interesting difference found in specimens in first nuptial plumage, the new form is consistently darker and blacker, plumage for plumage and season for season.

The females exhibit seasonal variation to an even more marked degree, but I cannot distinguish the first nuptial from the second or adult nuptial plumage. In both races fresh birds just after both the prenuptial and postnuptial moults are much more richly colored, and the brown areas of the feathers of the head, neck, back, and chest are reddish brown. Nor can there be any reasonable doubt that the prenuptial moult affects a greater area of the body than in male birds.

We must here consider a form recently described from the Sitka region by Mr. Harry S. Swarth as *Dendragapus obscurus sitkensis* (Condor, 1921, p. 59). It is stated that males are indistinguishable from *fuliginosus*, but that females are "much more reddish in general coloration." Specimens before me taken near Sitka would seem at first sight fully to bear out this diagnosis; the males cannot be separated from Vancouver Island and Washington specimens; the females obviously possess the reddish coloration ascribed to them and are strikingly different from a May bird from Vancouver Island; and Mr. Swarth cites spring birds from this locality as part of his material of *fuliginosus*. My Sitka birds are fresh September and October specimens which have completed their postnuptial moult and are consequently not comparable with the Vancouver bird which has not yet commenced the prenuptial moult. A specimen from Puyallup, Washington, taken June 10, 1909, is illuminating in this connection. This bird has practically completed the prenuptial moult, is consequently in fresh plumage, is indistinguishable from my fresh Sitka birds, and is just as strikingly distinct from the Vancouver specimen. The series from the Queen Charlotte Islands fully bears out this seasonal variation. A series of June specimens shows the same color differences between individuals which have not moulted and those which have. Late August specimens, with the postnuptial moult practically completed, are the reddest and most richly colored of all. This is to be expected when we remember that this moult affects the whole body, and not just a part of it as in the prenuptial moult. These August specimens are indistinguishable as far as their redness is concerned from the fresh Sitka material already discussed. Also, freshly moulted June birds cannot be distinguished on the basis of their redness from a Washington specimen in similar plumage. In fact, the only character that separates the new form in this respect from mainland birds is its relatively greater darkness of tone of coloration, a darkness which applies just as well to fresh "red" birds.

It will be seen from the foregoing discussion that the race *sitkensis* is left without a definite diagnostic character; and consequently I did not include it in my comparative description. I have attempted to show that the color variation before and after moult is very great in these birds, and that this color variation takes the form of increased redness in fresh specimens. Consequently, no new subspecies can be held to be characterized satisfactorily in being "much more reddish in general coloration." Nor can the coloration of the female be correctly described, unless the season of the year and the condition of the moult are also

specifically and clearly explained. This is particularly true of the prenuptial moult, a partial one at best and consequently very irregular. In the female of *munroi* this moult takes place anywhere between early April and the middle of June. On the other hand, I wish most emphatically to state that I am not in a position definitely to declare *sitkensis* invalid, as I have not seen spring material of any kind from the type locality. It is perfectly conceivable that in a large series, with material definitely proved comparable, Sitka birds do average more reddish in coloration. I certainly cannot deny it. But proof must be adduced that this "redness" is subspecific and not a question of moult, and this proof is wholly lacking in the original description. It is obvious that Mr. Swarth's description of the female *fuliginosus* can apply only to specimens taken prior to the prenuptial moult. If his description of the female *sitkensis* is based on specimens in nuptial plumage, the characters he brings forward are not of subspecific value. It must be shown that he possessed not only Sitka material taken before the prenuptial moult, but also British Columbia or Washington material in fresh nuptial plumage.

I am particularly indebted to Dr. Dwight for the loan of invaluable material of both races and for kindly checking my analysis of the moults and plumages of the various specimens in the series examined.

***Vermivora browni*, new species**

SPECIFIC CHARACTERS.—Most closely related to *Vermivora crissalis* (Salvin and Godman), but forehead gray, not oleaginous brown; crown-patch orange, not chestnut; rump olive-yellow, not oleaginous; below light grayish olive, scarcely lighter on the middle of the abdomen; under tail-coverts chrome yellow, not oleaginous chestnut; flanks light brownish olive, the chest and sides of breast washed with same; size apparently smaller.

TYPE.—No. 174885, Amer. Mus. Nat. Hist.; ♂ ad.; Miquihuana, Tamaulipas, Mexico; June 15, 1922; W. W. Brown.

DESCRIPTION OF TYPE.—Upper parts brownish olive ("olive-citrine"), changing rather abruptly to olive-yellow on the rump and upper tail-coverts; wings and tail plain brownish olive; forehead gray; crown-patch xanthine-orange, larger and more conspicuous than in any other species of the genus, scarcely concealed, only the lateral feathers minutely tipped with gray; lores and orbital ring grayish white; sides of head gray; below light grayish-olive, much grayer on the chin and throat; flanks light brownish-olive, the chest and sides of breast washed with the same; under tail-coverts cadmium-yellow. Wing, 60; tail, 45.5; culmen, 11; depth of bill at base, 4.5; tarsus, 11.

The single specimen on which this distinct new species is based was the great surprise of an interesting collection recently acquired by Dr. L. C. Sanford, containing an excellent series of the very rare *Spizella*

wortheni and several subspecies known only from this section of Tamaulipas. It was scarcely to be expected, however, that extra-tropical north-eastern Mexico would yield a new species at this late date.

Brown's warbler is of particular interest because of its relationship to *Vermivora crissalis*, known from only a single female collected in southwestern Mexico in the State of Colima. There is nothing on record about this species except the original description, and unfortunately it has never been figured. Unless, however, that description is grossly inaccurate, there is no possibility that *V. browni* is conspecific. While it is true that a female is compared with a male, sexual difference is well known to be slight in this genus. The chief differences between them are in the color of the crown-patch and the under tail-coverts, parts which do not vary sexually in other species.

Another point of interest is structural. The bill of *V. browni* is a decided departure from the normal in the genus. As in *V. bachmani*, the maxilla is curved downwards, but the curvature involves the entire maxilla rather than the tip. The depth of the bill at base is, however, proportionately much greater than in any other member of the genus. Thus, *bachmani* with a bill averaging 11.4 in length, averages only 3.5 in depth. Except for the lack of a subterminal tomial notch, the bill of *browni* can be almost perfectly matched by *Dendroica auduboni*, a much larger bird of a different genus. In this connection *Vermivora crissalis* needs a careful re-examination. The depth of the bill at base is not recorded, but in length it is apparently the greatest, and the other dimensions given would make it the largest member of the genus. It is true that the bill measurement was made from the tip to the rictus. This measurement is of course greater than the usual American measurement of the exposed culmen. The rictal measurement of *V. browni* is 12, one millimeter greater than the exposed culmen, so that it is unlikely that the exposed culmen of *V. crissalis* would be less than 13, as 14 is given for the rictal measurement. Nothing definite can be hazarded about the wing and tail measurements, as the European method of taking them usually gives slightly larger figures than ours.

The new species is named in honor of Mr. W. W. Brown, the collector, who has discovered so many species of interest in many parts of the New World. To Dr. L. C. Sanford I owe the privilege of describing it.

***Dendroica pinus*¹ *chrysoleuca*, new subspecies**

SUBSPECIFIC CHARACTERS.—Similar to *Dendroica pinus pinus* (Wilson) of eastern North America, but adult male very slightly yellower olive-green above; wings and

¹For change of name see Stone, 1921, Auk, p. 280.

tail clearer gray, less dusky; wing-coverts **NARROWLY** tipped and margined with pale gray, producing two bands which are much less distinct; superciliary streak, crescentic suborbital spot, chin, throat, and breast deeper and brighter yellow (gamboge-yellow), **ABRUPTLY** changing on abdomen, vent and under tail-coverts to a clearer, purer shade of white; size noticeably smaller; adult female scarcely differing from male, the yellow a little duller, much brighter than any female of typical *pinus* examined.

TYPE.—No. 166327, Amer. Mus. Nat. Hist.; ♂ ad.; Mt. Tina, Santo Domingo; January 10, 1917; R. H. Beck.

SPECIMENS EXAMINED

Dendroica pinus pinus.—133 ad. ♂, 41 ad. ♀ from the eastern United States, representing every season of the year.

Dendroica pinus achruster.—Bahamas: New Providence, 6 ♂, 1 ♀.

Dendroica pinus abacoensis.—Bahamas: Abaco, 1 ♂, 1 ♀.

Dendroica pinus chrysoleuca.—Santo Domingo: Mt. Tina, 1 ♂; Mt. Rusilla, 1 ♂, 1 ♀.

The pine warbler was long ago recorded from Santo Domingo by the late C. B. Cory, who reported the receipt of young birds taken in July, thus proving that the bird bred. Very probably, however, these specimens were of no value for purposes of comparison. The bird is mentioned as common by Verrill, who does not state whether he secured specimens. Mr. Ridgway, in the 'Birds of North and Middle America' (II, p. 601, footnote), suggests that Haitian references may be to one of the Bahama races or an unnamed form.

The three birds discussed above are part of the Brewster-Sanford Collection from Santo Domingo, which has already yielded so many novelties and rarities. They are all in unworn, fresh plumage, and the receipt of adequate material from the Bahamas now makes their description possible. As can readily be inferred, the new race is the brightest and most intensely colored extreme of the pine warblers, the two Bahaman races being distinctly duller and duskier than the typical race. The brilliant yellow throat and breast abruptly changing to a cleaner and purer white is a striking character, which makes the bird recognizable at a glance. True *pinus* is so variable that I have been careful to use only the most highly colored winter specimens for comparison in drawing up the diagnosis.

MEASUREMENTS

	Sex	Wing	Tail	Culmen	Tarsus
Mt. Rusilla	♂	71.	55.	11.5	20.5
Mt. Tina (type)	♂	66.5	50.	11.	19.
Mt. Rusilla	♀	65.5	49	11.	19.

***Cœreba oblita*, new species**

SPECIFIC CHARACTERS.—Closely related to *Cœreba tricolor* (Ridgway) of Old Providence Island, Caribbean Sea, but throat and chest averaging very slightly darker grayish white; breast and abdomen averaging slightly more greenish yellow; flanks and anal region very slightly grayer olive; wings and tail averaging much longer; bill much shorter actually as well as proportionately, the measurements not overlapping.

TYPE.—No. 10391, Field Museum of Natural History; ♀ ad.; St. Andrews Island, Caribbean Sea; February 16, 1887; R. Henderson.

MEASUREMENTS OF TYPE.—Wing, 69; tail, 47; culmen, 11.

SPECIMENS EXAMINED

Cœreba tricolor.—Old Providence Island, 8 ♂, 7 ♀, 9 young.

Cœreba oblita.—St. Andrews Island, 6 ♂, 3 ♀.

Last fall, with the courteous coöperation of the authorities of the Field Museum of Natural History, I was enabled to select several specimens of *Cœreba tricolor* for this Museum as part of an exchange between the two institutions. In cataloguing these specimens, I noticed that one from St. Andrews differed decidedly from others from Old Providence. An investigation showed that the new species had been referred doubtfully to *C. tricolor* by Mr. Cory in a list of birds collected on St. Andrews (Auk, 1889, p. 181). His labels, however, do not show any question mark, and he was undoubtedly misled by the extremely close color resemblance between the two. Mr. Ridgway was unable to identify positively the St. Andrews bird in the 'Birds of North and Middle America,' II, having seen no specimens. Apparently, therefore, this little honey creeper, inhabiting one of the least visited islands in the New World, has been forgotten for many years, awaiting critical determination. I am greatly obliged to Dr. C. E. Hellmayr for loaning me the entire series in his care, without which this study would have been impossible.

While not yet recorded, as with the other members of the genus, there is marked sexual difference in size in the two species under consideration, but none in color, except that females have the upperparts less black, more dusky, faintly tinged with olive. On this basis I regard a so-called male of each species as undoubtedly wrongly sexed. Five females of *C. tricolor* are apparently paler below than males, but they prove to be alcoholic specimens made subsequently into skins, and other females of both species do not exhibit this character.

The color differences of *Cœreba oblita* are so slight that its subspecific separation on this basis alone would be of doubtful value. However, its much longer wings and tail, and above all the shorter bill, are excellent characters. The latter, especially, is a constant character. As the two

birds do not intergrade even by individual variation in this respect and are isolated on two remote islands, their specific separation is in my opinion fully warranted.

TABLE OF MEASUREMENTS

Males	Wing	Tail	Culmen
<i>Cæreba tricolor</i>	65. -68. (66.6)	42. -45. (43.7)	13. -14. (13.5)
<i>Cæreba oblita</i>	68. -73. (69.3)	45. -49. (46.3)	11. -12. (11.7)
Females			
<i>Cæreba tricolor</i>	61.5-64. (62.4)	39. -41.5(40.3)	12. -13. (12.5)
<i>Cæreba oblita</i>	62. -67. (64.)	42. -45. (43.)	10. -11. (10.5)

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PROTOCERATOPS ANDREWSI, A PRE-CERATOPSID DINO- SAUR FROM MONGOLIA¹

BY WALTER GRANGER AND WILLIAM K. GREGORY

With an Appendix on the

STRUCTURAL RELATIONS OF THE *PROTOCERATOPS* BEDS

BY CHARLES P. BERKEY

The type of *Protoceratops andrewsi*, new genus, new species, was discovered on September 2, 1922, by Granger and party on the Kwei-wa-tung trail, east of Artsa Bogdo, Mongolia, during a preliminary geological and palæontological survey conducted by the Third Asiatic Expedition of The American Museum of Natural History. The specimen consists of a skull, lacking the occiput. It was found by Mr. Shackelford in exposures of red shale in a formation which has been provisionally referred to the Cretaceous by Professor Berkey.²

The skull (A. M. N. H. No. 6251) is hornless and far smaller than that of any known ceratopsian or ankylosaur, being only about 160 mm. in length from the anterior end of the premaxilla to the posterior border of the jugal. As seen from above, it is broadly triangular, with a pointed apex and wide lateral crests, the latter composed chiefly of the backward-and-downwardly expanded jugals. The greatest width of the skull across the posterior borders of the jugals is about 190 mm., while the depth of the jugal below the middle of the orbit is 43 mm. The orbits are very large (50 mm. in anteroposterior length), not surmounted by supraorbital bones or horns. The postorbital-squamosal bar is narrow. Parts of the anterior and lateral borders of the supratemporal fenestra as preserved indicate that the fenestra was large and that the occipital roof was very delicate and not produced as far backward as in later Ceratopsia. The squamosal broadly overlapped the enlarged jugal and was produced posterosuperiorly but was not greatly enlarged. The pineal foramen is small or absent. The single preorbital fossæ are far larger than in other predentates. The premaxillæ were very large and

¹Publications of the Asiatic Expeditions of The American Museum of Natural History. Publication No. 6.

²See Appendix, p. 7, below.

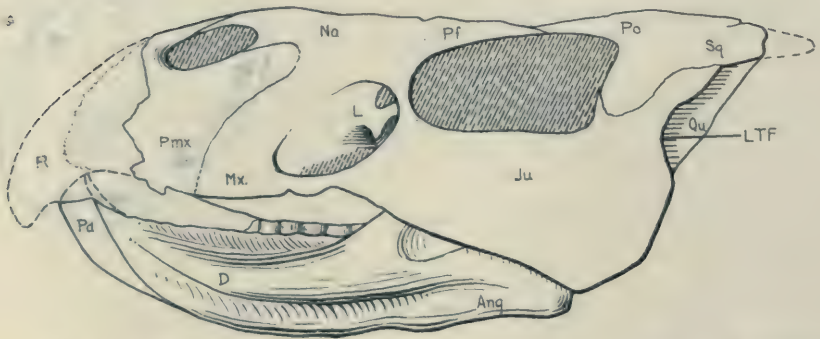


Fig. 1. *Protoceratops andrewsi*, type skull, side view. Position of mandible corrected. $\times \frac{1}{2}$



Fig. 2. *Protoceratops andrewsi*, type skull, top view. $\times \frac{1}{2}$

probably supported a large rostral bone, which is broken off; the premaxillæ and nasals approach the ceratopsian type and the same is true of the pterygoids, the internal nares, and the quadrates. The quadratojugal lies on the posterior surface of the quadrate.

The mandible has on each side a straight row of about nine relatively large and long-crowned teeth, worn on their buccal sides and set far inward toward the midline. The remains of the lower molar crowns suggest the three-pointed lower molars of ceratopsians, rather than the spatulate, many-cusped teeth of ankylosaurs and of European *Acanthopholidæ*.¹ The anteroposterior measurement of the four teeth shown in Fig. 1 is 28 mm. The last tooth preserved has its tip about 13 mm. above the alveolus. The first four teeth are represented by their alveoli. The diastema from the first alveolus to the predentary bone was about 14 mm. in length. The strong coronoid process rises from the dentary at a gentle slope. The predentary bone is well developed and has a pair of long inferior processes, one on either side of the midline.

At first sight the specimen suggested the *Procolophonia* in the very large size and backward prolongation of the orbits and in the presence of a lateral crest below and behind the orbit; but reference to that group is excluded, especially by the absence of a large pineal foramen, by the fact that the lateral crest is composed of the jugal instead of the quadratojugal, by the presence of a predentary bone and by the characters of the dentition. *Meiolania*, *Elginia*, the pariasaurs and other reptiles with flaring lateral crests all differ from *Protoceratops* in fundamental characters.

The presence of a predentary bone and the characters of the mandible and dentition positively determine the specimen as an ornithischian (orthopod) dinosaur. Of the Ornithopoda none of the known skulls have expanded lateral crests and there is a general tendency toward dorsoventral flattening of the beak. The squamosal is reduced and widely separate from the jugal, the latter not greatly expanded posteriorly. The Jurassic *Hypsilophodon* has a relatively short and primitive type of skull (Marsh, 1896, Pl. LXXXIV), which might well be the starting-point for the far more specialized conditions of *Protoceratops*.

Of the Stegosauria the most primitive is the Liassic *Scelidosaurus*, a longer skull, the details of which seem to point toward *Stegosaurus*. In the latter the squamosal is small and widely separated from the small jugal, the coronoid process of the dentary is reduced or wanting and

¹For figures of all these see Nopcsa, F. B., 1918, '*Leipsanosaurus*, n. gen. ein neuer Thyreophore aus der Gosau,' Sep. Földtani Közlemény, XLVIII, Taf. III.

the beak is somewhat flattened dorsoventrally. The Acanthopholidæ have small heads and spatulate, many-cusped teeth. The ankylosaurs agree with *Protoceratops*, rather than with *Stegosaurus*, in the characters of the temporal region, but have acquired a heavily armored skull roof and expanded muzzles.

The true Ceratopsia, hitherto unknown below the Upper Cretaceous of America, are all far larger than *Protoceratops*; all of them have horns; the crest is much expanded above and behind the occiput; there are epoccipital and supraorbital bones; and the orbit is small, placed high up and bounded by a wide postorbital bar. The preorbital fossa is reduced to a small slit.

As *Protoceratops* presents the opposite of these characters, it may prove necessary to erect for it a new suborder (Protoceratopsia) but we prefer at present to regard it only as the type of a new and probably primitive family, the **Protoceratopsidæ**, characterized by the lack of horns, the very large size of the orbits, and the narrowness of the postorbital-squamosal bar.

Protoceratops thus stands far below the Upper Cretaceous ceratopsians and structurally it tends to bridge the long gap between the latter and such primitive Jurassic Ornithopoda as *Hypsilophodon*.

The *Protoceratops* skull tends also to settle the relationships of the ankylosaurs. The latter differ widely from *Stegosaurus* and resemble the Ceratopsia in the temporal region of the skull, in the reduction of the pubis to a vestige and in the outward growth of the dorsal border of the ilium. Abel¹ groups them with the Ceratopsia, and *Protoceratops* may prove to be near the common ancestor of the two groups.

In conclusion, the discovery of *Protoceratops* constitutes one of the foremost items of direct evidence in support of the view advocated especially by Osborn and Matthew, namely that, as the palæontologic record of Asia is more fully explored, it will fill many gaps in our knowledge of the origin, evolution, and migrations of the late Mesozoic and Tertiary faunæ of western North America and Europe.

We therefore take pleasure in dedicating this important type to Mr. Roy C. Andrews in recognition of his splendid qualities as the organizer and leader of the American Museum Third Asiatic Expedition.

¹Abel, O., 1919, 'Die Stämme der Wirbeltiere,' p. 653.



Fig. 3. *Protoaceratops andreussi*, type skull, oblique side view. About two-thirds natural size.



Fig. 4. *Protoceratops andrewsi*, type skull, top view. Two-thirds natural size.

APPENDIX

STRUCTURAL RELATIONS OF THE PROTOCERATOPS BEDS

BY CHARLES P. BERKEY

The type *Protoceratops andrewsi*, described by Professor Gregory, was found on the return journey by Mr. Shackleford in making a rapid inspection of some ground a short distance from the trail while waiting for the rest of the party. A few minutes later all came up and joined in a search of the locality. The finds made in the first few minutes of the stop netted some fine specimens, although none surpassed the first one; and all proved to be so unusual in character that it was decided to spend the remaining two hours of daylight in fossil hunting. The next morning the expedition moved on.

The ground would undoubtedly richly reward a more extended investigation. We touched only one spot and each one of the party carried off a load of specimens, leaving behind in our hurry many others either too fragmentary or too heavy or too much imbedded in the rock for recovery.

The spot is on the north side of the Kwei-wa-ting trail, 50 miles east of Artsa Bogdo. The rocks are red, friable sandstones and shaly sandstones which are very well exposed at this point by erosion. Badland cliffs and remnants, more than 200 feet in total relief, form an escarpment here and mark the beginnings of a considerably dissected country extending for many miles northward and eastward, quite in contrast to the smooth peneplane surface over which the trail had led to this point. In fact, at a distance of less than half a mile the escarpment is not noticeable from the upper plain, although one can see that there is a belt of lower ground off to the side.

Beds of the same series and of apparently the same physical relations were crossed by Morris and Berkey on their side trip with camels from Artsa Bogdo to a large mountain group known as the Gurban Saikhan. Several hundred feet of red, sandy beds were seen on the north margin of the Gurban Saikhan, but where the examination was made the beds were barren. The Kwei-wa-ting trail, where the fossils were found, passes north of the Gurban Saikhan at a distance of 20 or 30 miles out on the open plain.

Although there was no time for local side study of the stratigraphic relations in this vicinity, enough of the geology was determined by this earlier trip to the Gurban Saikhan and by the continuous route-cross-section work kept up by the geologic staff to fix these strata structurally

within certain well-prescribed limits. They lie well above the great Jurassic or post-Jurassic unconformity, which is the most marked structural break in central Mongolia. They also lie beneath an early Tertiary or pre-Tertiary unconformity of much less physical prominence, these strata thus partaking of a deformation that antedates all Tertiary sediments.

They are to be regarded, therefore, as belonging to the same series that has been referred to in our reports as of Cretaceous age, using the term in its large sense to cover everything thus far found between the Jurassic strata on one side and Tertiary beds on the other.

This series doubtless does cover a very wide range. Some of the beds may correlate with the Comanchic of America. In Mongolia the series must for the present be kept flexible enough and broad enough to include the dinosaur-bearing beds of Iren Dabasu (already described in Amer. Mus. Novitates No. 42), the Ondai Sair dinosaur-bearing formation of the Hsanda Gol region, and the dinosaur-bearing Ashile formation of the basins north of Artsa Bogdo.

The relative positions in the time scale of these different local developments are yet to be determined, but they probably can be fixed definitely with the material already collected or to be collected this year. A tabulation of locality formational terms, without insistence on the significance of the order, is as follows:

Cenozoic	Tertiary		
		Unconformity.....	
Later Mesozoic	Cretaceous	Shamo Series	Iren Dabasu Formation Ondai Sair Formation Ashile Formation Dja-doch-ta Formation (<i>Protoceratops</i> Beds)
		Great Unconformity	
Earlier Mesozoic	Jurassic		

The beds seen at the Gurban Saikhan, together with these at Dja-doch-ta furnishing the *Protoceratops* remains along the Kwei-wa-wing trail, doubtless are identical with those seen by Chernov, the geologist

of the Kosloff expedition and referred to by him as the Red Khan-Khai beds. Khan-Khai is a well-established term introduced by von Richthofen and has been widely used, apparently rather indiscriminately, for any or all of the later sedimentary beds supposed by the earlier observers to have been formed in the disappearing or evaporating sea. But it is loosely used and undoubtedly has served to cover strata of a large range of age relations. Perhaps it is inadvisable now to attempt any narrower limitation. It is proposed therefore to introduce the term *SHAMO SERIES* for all of the later Mesozoic strata above the Great Unconformity.

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A NEW SPECIES OF ALLIGATOR FROM THE SNAKE CREEK BEDS¹

BY CHARLES C. MOOK

The material here described was found near Agate, Nebraska, by Mr. Albert Thomson, who has been for a number of years in charge of the American Museum's field work in this locality. It occurred in the Lower Snake Creek beds, which have been determined by Dr. W. D. Matthew to be of Middle Miocene age. The material indicates a new species of *Alligator*, which may be named *A. thomsoni* in honor of the discoverer. The skull and most of the remaining material was collected in 1921, the small well-preserved mandibular ramus in 1922. The collection includes, besides the specimens chosen as type and paratypes, several fragmentary skulls and jaws, teeth and dermal plates.

Alligator thomsoni, new species

TYPE.—A well-preserved skull of moderately large size. A. M. N. H. No. 1736.

PARATYPES.—Three mandibular rami. A. M. N. H. Nos. 1737, 1738, 1739.

GENERAL FORM

The skull is excessively short; snout about one and one-ninth times as long as its breadth at the base. The anterior border of the snout is very broad, much as in both of the living species of *Alligator*. The lateral borders immediately posterior to its anterior extremity diverge sharply in relatively straight lines, so that the muzzle at the level of the fourth maxillary teeth is one and one-fifth times as broad as in a Florida alligator of the same length. The borders of the snout are less smooth, both in the superior and lateral aspects than in the southern alligator. There is a marked constriction at the level of the spaces between the sixth and seventh maxillary teeth. The breadth at the articular extremities of the quadrates is about five-fourths of that of a Florida alligator of the same length. The cranial table is relatively much larger, both in lateral and longitudinal directions, than in the common living species; also the lateral borders of the cranial table converge more sharply forward.

There is a rapid descent in the anterior direction from the level of the interorbital plate to that of the base of the snout and there are two

¹Contributions to the Osteology, Affinities and Distribution of the Crocodilia, No. 11.

small ridges extending forward from the anterior ends of the orbits. In these characters the skull resembles that of the living Chinese alligator and the three species of the South American *Jacare*, rather than the Florida alligator. The pitting is very rough.

THE CAVITIES OF THE SKULL

SUPRATEMPORAL FENESTRÆ.—These fenestræ resemble closely those of *A. mississippiensis* in form but are relatively larger in size. They resemble very closely those of *A. sinense* in both size and shape, and also in the fact that the small accessory fenestræ are visible when the skull is viewed from above. Each fenestra is only slightly shorter than the corresponding half of the narial aperture in the longitudinal direction but is considerably broader in the transverse direction, on the whole, occupying much less space. The two fenestræ are widely separated from each other.

INFRATEMPORAL FENESTRÆ.—These cavities are very similar to the corresponding cavities in *A. sinense*. They are relatively somewhat larger than those of *A. mississippiensis*.

ORBITS.—The orbits are large. They are slightly shorter than in a southern alligator of the same length but are considerably broader. In form they approach closer to the normal crocodilian orbits than to the rather abnormal orbits of *A. mississippiensis*.

EXTERNAL NARIAL APERTURE.—This cavity is small, especially in the transverse direction, compared with the nares of both species of living alligators. At its anterior end it is considerably narrower than in a Florida alligator of the same length and its length is slightly less. Its lateral borders converge less sharply backward than in the living species, consequently it is relatively broader at its posterior end.

The nasals penetrate far forward into the aperture but do not completely divide it. The anterior ends of these nasal processes appear to be little, if at all, injured, but the premaxillaries along the anterior border of the aperture exhibit a broken border; evidently a process extended backward from this border to meet the nasals.

PREMAXILLARY FORAMEN.—The small foramen on the palatal surface of the premaxillary is very broad and short. Its length is only slightly greater than its breadth. Its posterior border is rounded as in *A. mississippiensis*; its lateral borders are not rounded as in either of the living alligators but are characterized by slightly angular outlines.

PALATINE FENESTRÆ.—Only the anterior ends of the palatine fenestræ are known, the posterior borders not being preserved. The

anterior borders, which are situated at the level of the anterior edges of the tenth maxillary alveoli, are broadly rounded. The internal borders of the two fenestræ converge sharply in the posterior direction and the fenestræ were much broader than in the skull of a Florida alligator of the same length.

INTERNAL NARIAL APERTURE.—The region of the internal narial aperture is not preserved.

THE BONES OF THE SKULL

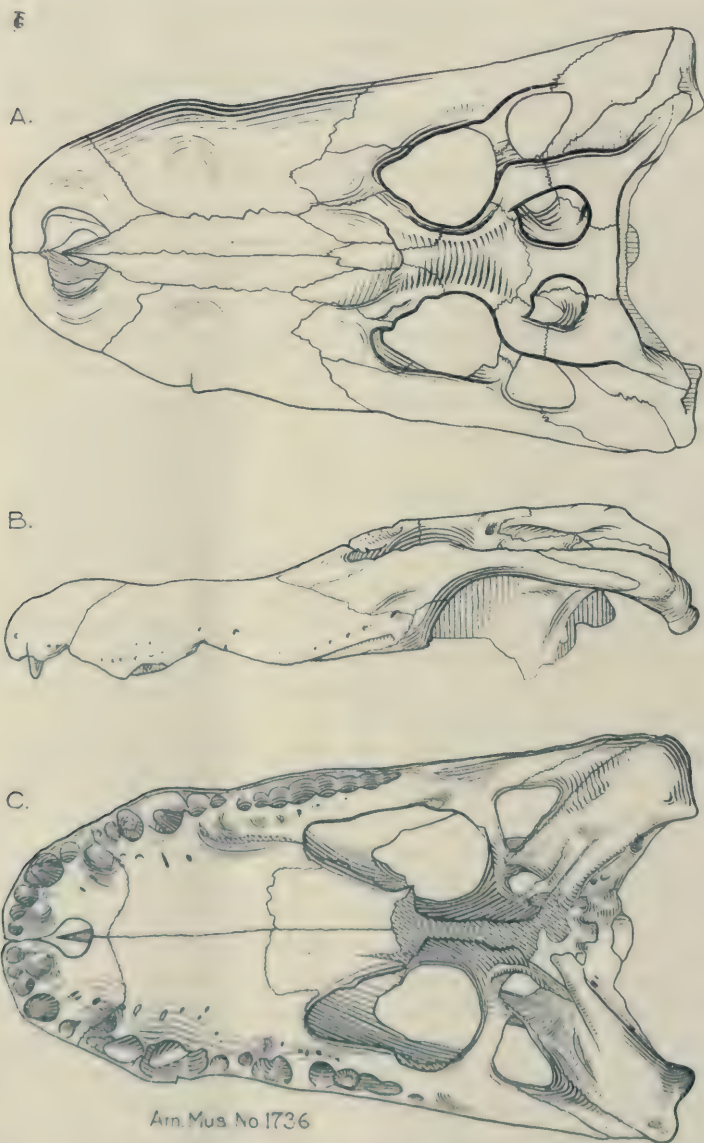
PREMAXILLARIES.—The premaxillaries are very short and broad. Their posterior processes extend back to the level of the fourth maxillary teeth. The external narial aperture extends back to the level of the second maxillary teeth. A process evidently extended back from the anterior border of the aperture to meet the nasals but it is not preserved; its broken base is noticeable on the anterior border of the aperture.

On the palate the premaxillo-maxillary suture is more pronouncedly undulating than in *A. mississippiensis*. It resembles *A. sinense* in this respect, except that the details of the sutural outline are different. It extends back to the level of the second maxillary teeth about midway between the external border of the skull and the median line. At its intersection with the latter it is opposite the first maxillary teeth.

There are five teeth in each premaxillary. The first and second are the smallest in size, the third and fifth are slightly larger and the fourth is considerably larger. The first four teeth are very close together; the fifth is only slightly removed from the fourth. The teeth are very stout, much more so than in the Florida alligator. The pits which lodged the first and fourth mandibular teeth are very deep but do not pierce the bone. There are very faint depressions which probably lodged the second and third mandibular teeth but these are much less distinct than in the living alligators. The depressions are all internal to the line of premaxillary teeth themselves.

MAXILLARIES.—These bones are very short and broad. The sutures with the nasals are especially short. The sutures with the prefrontals, lacrymals and jugals are very irregular, even more so than in the Florida alligator, resembling more the corresponding sutures in *A. sinense*. As in both species of living alligators, the maxillaries have contact with the prefrontals, excluding the lacrymals from contact with the nasals.

When viewed from above, the maxillaries appear to extend little, if at all, back of the level of the anterior ends of the orbits. Seen from the side, however, they extend back as far as the level of the centers of the



Am. Mus. No. 1736

Fig. 1. *Alligator thomsoni*, new species. Type specimen, skull (A. M. N. H. No. 1736).

One-fourth natural size. A, superior view; B, lateral view, left side; C, inferior view.

orbits; the jugals project slightly and partly conceal the posterior processes of the maxillaries from above.

On the palatal surface of the skull the maxillaries are excessively short. The distance from the anterior ends of the palatines to the premaxillaries along the median line is about seventy-three per cent of the distance from the anterior ends of the palatines to the level of the posterior ends of the posterior processes of the maxillaries on the lateral borders of the skull. In a Florida alligator of the same skull-length the length of the maxillaries along the palatal surface is one hundred and seventeen per cent of the length of the posterior processes. In a medium-sized skull of *A. sinense* (A. M. N. H. No. 23898), however, the median palatal diameter of the maxillaries is only fifty-eight per cent of the length of the posterior processes. In the Florida alligator the median maxillary suture lies opposite ten maxillary teeth; in the species described it lies opposite eight, and in the skull of *A. sinense* mentioned above, it lies opposite five. The small number in the latter, however, may be due partly to immaturity of the specimen.

The premaxillo-maxillary suture has been described above. The sutures with the palatines resemble closely those of *A. mississippiensis* except that the proportions of various components are different. The longitudinal portions are shorter and the transverse portions are longer in the skull described. The resemblance to *A. sinense* in this respect is not so close.

The left maxillary contains alveoli for fourteen teeth, of which the third and eleventh are preserved, as well as rudiments of the first and fourth. The alveoli of this maxillary are all close together except the sixth and seventh, which are slightly separated, and the ninth and tenth, which are widely separated. The first and second, the fourth and fifth, the eighth and ninth, and the tenth to the fourteenth alveoli, inclusive, are all confluent.

The right maxillary differs somewhat from the left. It contains alveoli for fifteen teeth. The fourth of these contains a rudimentary tooth. There is a space between the sixth and seventh alveoli, as in the left maxillary, but there is none between the ninth and tenth. The eighth to the fifteenth alveoli, inclusive, are confluent. In both maxillaries the first alveoli are very small. There is a progressive increase in size in the posterior direction to the fourth, which is far larger than any other alveolus in the jaw. The fifth is much smaller than the fourth. In the Florida alligator the third maxillary alveolus is only slightly greater than the fifth. In *A. sinense* the difference in size between the third and

fifth maxillary alveoli is only slightly greater. In the skull described the third alveolus has nearly twice the diameter of the fifth. In general, the alveoli are relatively larger than in either of the living species of *Alligator*, and the teeth preserved are much stouter. There are deep pits, which received mandibular teeth, at the premaxillo-maxillary sutures and slightly internal to the spaces between the sixth and seventh maxillary teeth. In this character the skull resembles that of *A. mississippiensis* more than that of *A. sinense*. In the latter there are pits at the premaxillo-maxillary suture and slightly internal to the spaces between the fifth and sixth teeth.

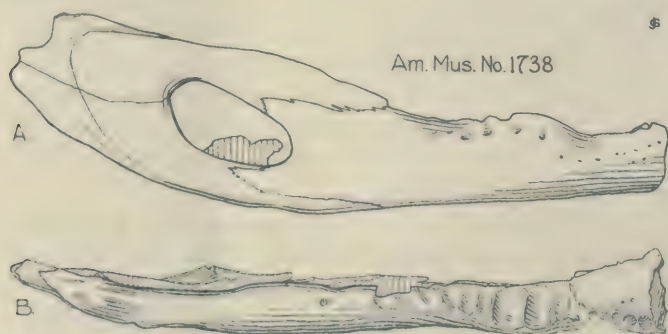


Fig. 2. *Alligator thomsoni*, new species. Paratype specimen, right mandibular ramus (A. M. N. H. No. 1738).

One-fourth natural size. A, external view; B, superior view.

NASALS.—The nasals are short and broad. Their length is about four-fifths of that in a Florida alligator of the same total skull-length. The sutures with the prefrontals are considerably shorter than in either of the living species of *Alligator*. The sutures with the frontal are much longer than in either of the modern species, and each nasal sends back a conspicuous wedge-shaped process between the frontal and the corresponding prefrontal.

The maximum breadth of the nasals is only very slightly anterior to the maxillo-nasal-prefrontal contacts, contrasting with the living alligators, in which it is far forward.

From the level of their greatest breadth backward the nasals narrow rapidly and regularly, in contrast with the irregular outlines of the posterior portions of the nasals in the Florida alligator, but agreeing with the Chinese alligators. The anterior processes of the nasals project forward into the external narial aperture for a distance equal to three-

fourths the length of the latter. Their tips appear to be complete and not broken off, but they probably were in contact with processes of the premaxillaries which extended backward from the anterior border of the aperture. The anterior nasal processes are broad where they enter the aperture.

LACRYMALS.—These bones are relatively short and broad, as in the living *A. sinense*. Their breadth is about one and one-third times that in a Florida alligator of the same skull-length, whose lacrymals are also equal in length. In form they differ from those of either of the living alligators. Their lateral boundaries converge sharply forward in symmetrical patterns (which differ slightly on the two sides of the skull), contrasting with the subquadrangular outlines in the modern alligators.

PREFRONTALS.—The prefrontals resemble those of *A. mississippiensis* in many respects. Their lateral borders converge regularly forward, however, instead of joining a very irregular transverse anterior border. Their sharp anterior extremities resemble similar structures in *A. sinense*. Their posterior portions are elevated above the level of their anterior portions, consequently their surface profile is somewhat irregular, as in *A. sinense* but not as in *A. mississippiensis*.

FRONTAL.—The frontal is relatively large, both in the longitudinal and transverse diameters. The interorbital plate is about one and one-third times as broad as in a Florida alligator skull of the same length.

The anterior process is large; it extends forward as a prominent wedge between the posterior processes of the nasals, contrasting with rather small processes in the living alligators. The process ends considerably further forward than the level of the anterior ends of the orbits; the anterior frontal process in the living alligators ends very slightly in front of this level.

The interorbital plate is concave in transverse profile as in *A. mississippiensis* and *A. sinense*. This plate is situated at a distinctly higher level than the base of the snout and there is an abrupt drop from the higher level to the lower, in fact a slight overhang. The longitudinal profile therefore differs considerably from that in the Florida alligator, but resembles somewhat that of the Chinese form.

The posterior plate is relatively broader than in the Florida species and the suture with the parietal is not so nearly transverse but swings backward and is more wavy in outline; in these characters there is a resemblance to *A. sinense*. Two deep pits, extending below the general level of the skull-top, are situated along this suture immediately in front of the supratemporal fenestræ. The sutures with the postorbitals are

longer than in the Florida alligator and they converge more in the posterior direction. In this character also the skull resembles that of *A. sinense*. These sutures, with the intervening fronto-parietal suture, form a broadly rounded curve instead of three sides of a rectangle. The superficial pits of the frontal are very coarse-textured and deep.

POSTORBITALS.—The postorbitals are considerably larger in every respect than those of the living alligators. The inferior bar, which de-



Fig. 3. *Alligator thomsoni*, new species. Paratype specimen, left mandibular ramus (A. M. N. H. No. 1739).

One-fourth natural size. A, superior view, with reconstruction of missing portions to indicate degree of divergence of the two rami; B, external view.

cends to unite with the ascending process of the jugal and separate the infratemporal fenestra from the orbit, is unusually stout.

SQUAMOSALS.—These bones are large. They occupy a relatively greater percentage of the lateral borders of the cranial table than in the living Florida species. They occupy about the same percentage as in *A. sinense*. Their postero-external processes are unusually stout and the transverse distance between their extremities is unusually great.

PARIETAL.—The parietal is considerably larger than in *A. mississippiensis* both in longitudinal and transverse directions and appears to correspond in size with that of *A. sinense*.

The antero-lateral bars are long, giving a great breadth to the anterior end of the bone, as in the Chinese alligator. The interfenestral plate is broad, contrasting with a relatively narrow plate in the Florida alligator and with the very much narrower plates in the species of *Crocodylus*. It is comparable in breadth with that of *A. sinense* but lacks the uprolled edges of the latter. The parietal occupies slightly less than one-third of the posterior border of the cranial table, as in the living *A. sinense*. The parietal lacks the slight depression on the surface between the interfenestral plate and the posterior border of the cranial table, which is present in the living alligators.

SUPRAOCCIPITAL.—The supraoccipital is large. It occupies no part of the superior surface, or posterior border of the cranial table. It occupies a larger area on the posterior surface of the skull than in the Florida species. Its diameters, both transverse and vertical, are greater than in the latter species. It extends unusually far down toward the foramen magnum. The small depressions above the main body of the supraoccipital and lateral to the parieto-supraoccipital sutures are broad transversely and shallow vertically. This may be due partly to the effects of pressure.

QUADRATES.—These bones are short and broad. The breadth of their articular surfaces is about one and one-fifth times as broad as in a Florida alligator of the same skull-length. The quadrato-jugal-quadrato suture is very similar to that in *A. mississippiensis* or *A. sinense*.

EXOCCIPITALS, BASIOCCIPITAL AND BASISPHENOID.—The transverse diameters of the exoccipitals is relatively very large. The condyle of the basioccipital is very stout and the remainder of the basioccipital is broad. The basisphenoid presents no character of any significance except that it is broad.

QUADRATO-JUGALS.—These bones are not especially distinctive.

JUGALS.—The jugals resemble those of the living alligators, except that the sutures with the maxillaries are more irregular.

PALATINES.—The palatine bones are exceedingly short and broad. Their anterior processes occupy about two-fifths of the breadth of the palate. These processes extend forward to the level of the eighth maxillary teeth. The suture between the anterior processes and the maxillaries is a nearly straight transverse line. The lateral borders of the central portion converge rapidly in the posterior direction. The posterior portions are not preserved.

PTERYGOIDS.—The pterygoids are not preserved.

ECTOPTERYGOIDS.—These are partly preserved but are not especially characteristic.

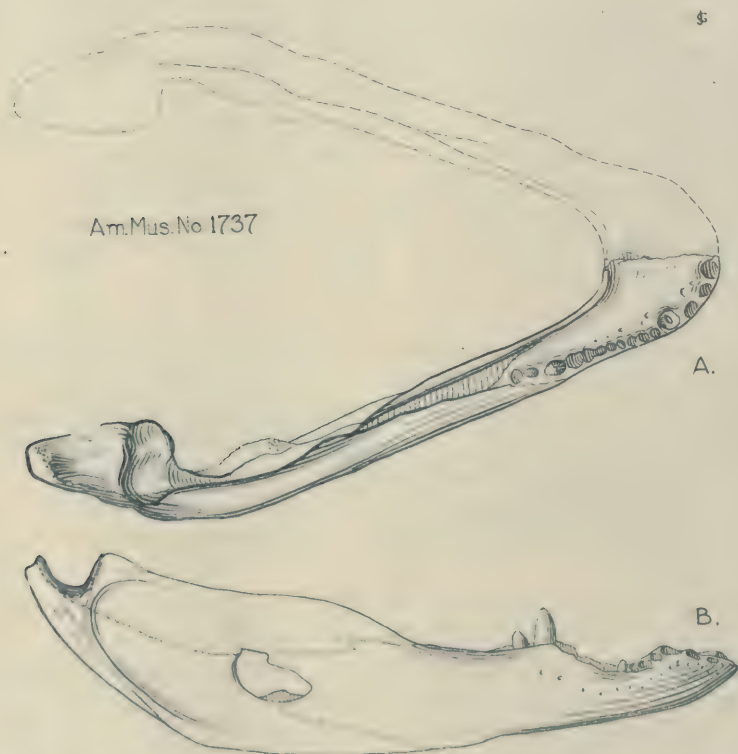


Fig. 4. *Alligator thomsoni*, new species. Paratype specimen, right mandibular ramus (A. M. N. H. No. 1737).

One-half natural size. A, superior view, with outline of opposite ramus to indicate degree of divergence of rami; B, external view.

THE MANDIBLE

Several mandibular rami are preserved which may be considered as paratype specimens. One of these, a left (A. M. N. H. No. 1739), may possibly belong to the same individual as the skull but this is not at all certain. Another is a right of nearly the same size, and a third, a right and the most complete, is smaller. The following description is based chiefly upon this smaller specimen.

In its general form the mandible differs greatly from that of the Florida alligator and resembles more closely that of *A. sinense*. It bears

a very close resemblance to the mandibles of some of the Eocene crocodilians, especially *Allognathosuchus polyodon* (Cope) and *A. heterodon* Cope.

Considerably more than half the length of the mandible lies posterior to the last alveolus, presenting the appearance of having the teeth crowded forward. This character is probably largely emphasized by the youthful stage of the specimen, but in several Chinese alligators of smaller size the length of the dental series is less than that of the edentulous portion of the mandible.

In the small perfect specimen (No. 1737) the symphysis extends back to the level of the eighth maxillary teeth; in the large left ramus (No. 1739) it extends only to the level of the fifth. In young and old Florida alligators there is no difference in this respect. This suggests the possibility that the two rami may not belong to the same species. Other characters, however, are sufficient to warrant their being considered together as paratypes. The teeth in the region of the symphysis are very small.

The largest tooth in the jaw, judged from the alveolus, is the fourth; the first is only slightly smaller. The second and third are of moderate size. Immediately posterior to the large fourth alveolus are seven small alveoli. These decrease in size from the fifth alveolus to the eighth. The ninth is equal in size to the eighth; from this point back to the twelfth there is a steady increase in size, the twelfth being nearly as large as the first. Posterior to the twelfth are alveoli for six (the small jaw, No. 1737) or seven (the larger jaws, Nos. 1738, 1739).

All of the alveoli posterior to the third are close together, many of them being confluent.

The foramen on the external surface is smaller than in the living species. The vertical height of the jaw is relatively great. The profile of the mandible is very wavy.

The splenial is long and in the small specimen (No. 1737) curves inward and reaches within about one millimeter of the symphysis.

SUMMARY OF CHARACTERS

The characters of the species may be summarized as follows. Entire skull short and broad; base of snout at a lower level than that of the interorbital plate and sharply separated from it; two ridges extending forward from the anterior ends of the orbits; teeth very stout; nasals not extending entirely across external nares; lateral border of skull and mandible very wavy; mandibular symphysis long; great range in size in mandibular teeth.

RELATIONSHIPS

In most of its characters this species differs from the Florida alligator much more than from the Chinese alligator, *A. sinense*. The resemblance to the latter is remarkably close, so close that it evidently indicates direct descent. The resemblance to some of the Wasatch crocodilians is also very close and it may be considered as intermediate between these and the living alligators. According to this interpretation *A. sinense* is more primitive in structure than *A. mississippiensis*.

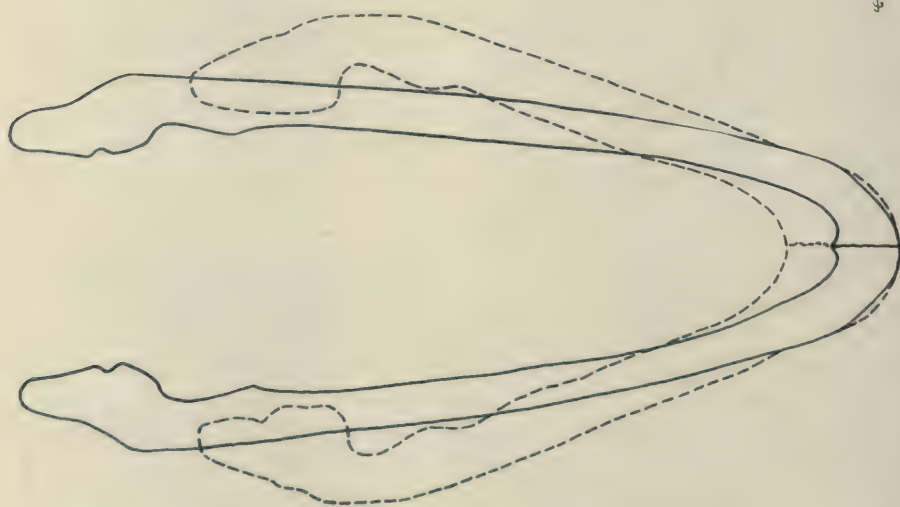


Fig. 5. *Alligator thomsoni*, new species and *A. mississippiensis* (Cuvier).
Outlines of mandibular rami, indicating relative degrees of convergence of rami. Solid lines: *A. mississippiensis* (A. M. N. H. No. 12572); dash lines: *A. thomsoni* (A. M. N. H. No. 1737). Both outlines one-half natural size.

MEASUREMENTS

SKULL (No. 1736)

Length, Ends of Quadrates to Tip of Snout	36.3cm.
" Occipital Condyle to Tip of Snout	33.0
Breadth across Quadrates	22.3
" at Base of Snout	17.4
" at Fourth Maxillary Teeth	16.0
" across Premaxillo-maxillary Suture	11.5
" of Cranial Table, Posterior	11.8
" of Plate between Supratemporal Fenestra	1.6
" of Interorbital Plate	3.2
Length of Maxillaries along Medial Line of Palate	8.6

MANDIBLE

	No. 1737	No. 1738	No. 1739
Length, Total	15.9 cm.
Height, Maximum	4.0	7.9	8.2
Length, Dental Series	8.5	19.4
“ Posterior to Dental Series	10.8
“ Symphysis	3.0

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POLYCHÆTOUS ANNELIDS FROM LOWER CALIFORNIA WITH DESCRIPTIONS OF NEW SPECIES¹

BY AARON L. TREADWELL

The following taxonomic paper refers to a collection of polychætous annelids made by the U. S. S. 'Albatross' off the coast of Lower California. The specimens were in most cases poorly preserved, so that determination of species was sometimes uncertain and in a few cases not possible. The families certainly represented and the number of species found in each are shown in the following table.

FAMILY	OLD SPECIES	NEW SPECIES
Amphinomidæ.....	1	
Polynoidæ.....	5	1
Sigalionidæ.....	1	
Aphroditidæ.....	2	
Nephtydidæ.....	1	
Nereidæ.....	3	
Leodicidæ.....	8	
Cirratulidæ.....	?	
Maldanidæ.....	1	1
Terebellidæ.....	2	

With two exceptions each species is represented by only a very few individuals. These exceptions are *Onuphis* (*Nothria*) *hiatidentata* Moore, and *Hyalinæcia tubicola* (Müller) Malmgren subspecies *stricta* Moore, which together make up more than half the bulk of the collection. In connection with these two species the following ecological note is of interest.

In his original description Moore comments on the "remarkable example of associative resemblance" which *Onuphis* (*Nothria*) *hiatidentata* exhibits, for it lives in close association with *Hyalinæcia tubicola* Malmgren subspecies *stricta* Moore and superficially looks more like *Hyalinæcia* than like *Onuphis*. I find that it appears to be developing the habit of occupying *Hyalinæcia* tubes instead of making some of its own. A considerable number were found in what are evidently the normal form of tubes for this species of *Onuphis*. These tubes are oval in cross-section, have a groundwork of a thin whitish material that looks like wet tissue paper but is extremely tough, and have on the outside more or less foreign matter, the most abundant of which consists of much-worn

¹Scientific Results of the Expedition to the Gulf of California in charge of C. H. Townsend, by the U. S. Fisheries Steamer, 'Albatross,' in 1911; Commander G. H. Burrage, U. S. N., Commanding. X. Published by permission of the U. S. Commissioner of Fisheries.

cylindrical shells of foraminifera. *Hyalinæcia tubicola* (Müller) Malmgren subspecies *stricta* Moore, like other species of this genus, builds a quill-like tube of very hard, tough chitin, slightly narrower at one end than at the other, open at both ends, and slightly curved. Rarely coelenterates or barnacles are attached to the surface. Small tubes are translucent white, older ones are brown.

As stated above, many of the *Onuphis* were in the tubes I have described as typical. Others had attached bits of *Hyalinæcia* tubes to the outside of their own. In other cases the *Onuphis* was living inside a *Hyalinæcia* tube of which one side had broken away and the break was repaired with characteristic *Onuphis* material. Still others were living in complete *Hyalinæcia* tubes and there was no trace of the characteristic *Onuphis* tube-material. This occurred often so that I very soon learned that it is not safe to assume that the animal in a *Hyalinæcia* tube is really *Hyalinæcia* and not *Onuphis*. Obviously, *Onuphis* may construct a tube of its own, but it frequently uses instead an empty one of *Hyalinæcia*.

Amphinomidæ

Chloeia flava (Pallas)

Aphrodita flava PALLAS, 1766, p. 97, Pl. VIII, figs. 7-11.

One specimen. Beach at Francisquito Bay, Lower California.

Polynoidæ

Lagisca multisetosa Moore

Lagisca multisetosa MOORE, 1902, pp. 267-269, Pl. XIV, figs. 29-36; 1908, p. 335.

Harmothoe multisetosa MOORE, 1910, pp. 340 and 341.

Through an error in locality labels, Moore first described this species as from Greenland, but he later corrected this and showed that it is really an Alaskan form. In the last of the above references, Moore reports on the study of a number of individuals and concludes that it is a highly variable species whose limits can be accurately ascertained only if a large number are available for study.

The present collection contains a single specimen lacking the median tentacle and with only a fragment of an elytron left. In many respects it agrees with Moore's description but it does not show cilia on the palps or on the peristomial cirri. The fragment of the elytron is thickly studded with conical spines, but not enough of it is left to enable me to determine whether the papillæ described by Moore are present. In view of the similarities between this and Moore's description, I have tentatively located it here.

Station D. 5682; 491 fathoms; bottom temperature F. 40.8°.

***Admetella hastigerens* Chamberlin**

Admetella hastigerens CHAMBERLIN, 1919, pp. 64-67, Pl. IX, figs. 6-8.

Chamberlin described this species from one specimen collected off Panama in 581 fathoms. The Albatross collection contains five specimens, none of which is complete, but it is possible by a comparison of the five to get a fairly complete description. The largest was 100 mm. long and 8 mm. wide, thus a trifle larger and narrower than Chamberlin's specimen. The individual which is in most respects the best preserved is 50 mm. long.

The prostomium agrees in general with Chamberlin's description, but the "lateral extensions" are much more delicate than one would infer from that description, being extremely thin, scale-like structures, which, if the preservation has not been good, look very much like flakes of epidermis that have loosened from the surface. The median tentacle has a large ceratophore inserted into the dorsal middle line of the prostomium and with a diameter about one-fourth that of the latter. It has a length about equal to twice its diameter. The style is extremely delicate and slender, extending to about somite 9. It broadens near the end and then abruptly narrows to an acute apex. In the 50 mm. specimen the ceratophores of the lateral tentacles are hidden under the scale mentioned above, while the styles are very short and slender, hardly longer than the scale. In a specimen of twice this size the styles are relatively longer, slightly swollen toward the end and with a sharp-pointed apex. There is a faint trace of pigment around the swollen portion. The palps are more slender than in Chamberlin's specimen and have acute apices.

The dorsal and ventral cirri of the first parapodium resemble the median tentacle in form and size and are larger than the palps. The ventral cirrus of the third parapodium is similar to these in form and size but that of the fourth is much shorter and hardly longer than the parapodium. Succeeding ventral cirri are progressively shorter and the eighth is a slender, sharp-pointed structure attached to the ventral face of the parapodium and not reaching the apex. The dorsal cirri are broken in nearly all specimens, but those that remain agree in all respects with those of the first two somites. The pharynx is protruded in a 100 mm. specimen. It is 12 mm. long, smooth throughout the greater part of its length, but with roughenings toward the end. At the apex, above and below, is a row of about fourteen soft papillæ and three light-brown teeth.

A single elytron, the first or second, remains on the 100 mm. animal. It is of sufficient size to cover, with its mate, the dorsal surface of the body

and probably did so during life. It is too poorly preserved for accurate description, but is apparently nearly circular in outline and of a very delicate texture. In the preserved condition the color is gray, deepening into black on the margin near the point of attachment of the elyrophore. From this point a colorless band runs diagonally to the margin of the elytron.

In addition to the broad flat type of setæ described by Chamberlin in Pl. ix, figs. 7 and 8, I find another type having long slender stalks, flattened and with serrated margins toward the ends.

Station D.5676; 645 fathoms; bottom temp., F. 39°.

Station D.5677; 735 fathoms; bottom temp., F. 38.6°.

Station D.5685; 645 fathoms.

Station D.5692; 1076 fathoms; bottom temp., F. 37.1°.

***Halosydna brevisetosa* Kinberg**

Halosydna brevisetosa KINBERG, 1855, p. 385.

Station D.5678; 13½ fathoms. One specimen.

***Lepidasthenia curta* Chamberlin**

Lepidasthenia curta CHAMBERLIN, 1919, pp. 61–63, Pl. v, figs. 4–9.

Station D.5683; 630 fathoms; bottom temp., F. 39.1°.

***Polynoë lordi* (Baird)**

Lepidonotus lordi BAIRD, 1863, p. 107.

Pichilingue Bay, Lower California. Three specimens.

***Eunoë exoculata*, new species**

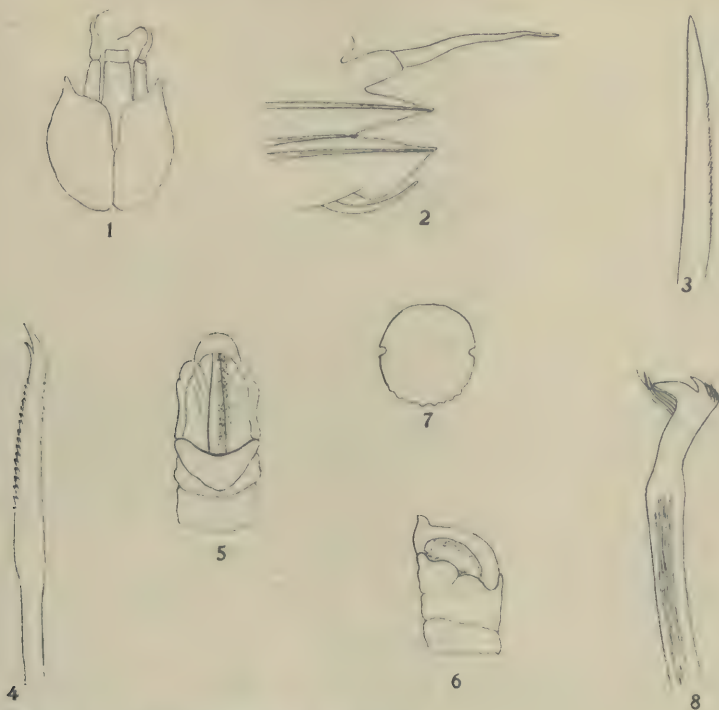
Figures 1 to 4

Two specimens, one incomplete. The entire specimen is 30 mm. long and 7 mm. in greatest body width. The body narrows somewhat abruptly toward the anterior end, and much more gradually posteriorly. There are 38 somites in the body and 15 pairs of elyrophores. No elytron remains in the complete specimen, but the other retains one which is much wrinkled.

The prostomium is a trifle longer than wide, its greatest width being about in the middle (Fig. 1). Posteriorly it narrows gradually to a base that is not more than one-third the greatest diameter. Anteriorly the narrowing is very slight, each half terminating in a peak which is placed well toward the outer margin and at a considerable distance from the median tentacle. The median groove is prominent and the ceratophore of the median tentacle is inserted into it to about the middle of the prostomium. On either side of the prostomium are two spots which evidently are eyes, though they are not pigmented. I am uncertain if this is normal or if the pigment may not have been removed in the preservation. The posterior pair of these lie on the dorso-lateral surface of the prostomium near its posterior end, the anterior on the ventro-lateral surface at the region of its greatest width, and are not visible in a dorsal view of the head region.

The ceratophore of the median tentacle is about one-third as wide as the prostomium, and the length of its free portion is about equal to its width. The style is absent in both specimens. The ceratophores of the lateral tentacles arise at some distance from the peaks, are shorter than that of the median tentacle, and about one-third its diameter. The style is slender and about three times as long as the ceratophore (foreshortened in the drawing). Only one palp remains. This is slender and about four times as long as the prostomium. Most of the dorsal cirri are lost but the larger of the two specimens retains a few at the posterior end. These are slender and longer than the transverse diameter of the body. They do not have any swelling at the ends.

A parapodium from near the middle of the body (Fig. 2) has neuropodium and notopodium of approximately equal length, each with an acute apex into which an acicula extends. Another acicula reaches the surface at the middle of the parapodium. The aciculae are dark brown at the bases but have slender colorless apices. The dorsal cirrus has a heavy ceratophore and a slender style, the ventral cirrus is more slender



Figs. 1 to 4. *Eunoë exoculata*, new species.

Fig. 1, prostomium $\times 10$; 2, middle parapodium $\times 7$; 3, seta $\times 45$; 4, seta $\times 45$.

Figs. 5 to 8. *Maldane cristata*, new species.

Fig. 5, anterior end, dorsal view $\times 5$; 6, anterior end lateral view $\times 5$; 7, anal plate $\times 5$; 8, uncinus $\times 185$.

than the dorsal and does not reach the apex of the parapodium. Except for variations in length, the notopodial setæ are all alike, with moderately acute apices and poorly defined denticulations along one face (Fig. 3). The neuropodial setæ (Fig. 4) are all longer than the notopodial and are all alike in form, except that some near the dorsal face of the tuft are much longer than the others. Each suddenly widens toward the end and then gradually narrows, ending in a large terminal and a smaller subterminal tooth. Along the widened region are rows of toothed plates which appear most clearly in profile but apparently extend entirely around the seta.

No elytra are retained on the type. The paratype has one very much shriveled elytron, with a circular outline but with no fimbriations or surface markings.

Station D.5698; 475 fathoms; bottom temp., F. 39.9°.

Type in The American Museum of Natural History.

Sigalionidæ

Sthenolepis areolata (McIntosh)

Leanira areolata MCINTOSH, 1885, p. 151, Pl. XXI, fig. 3; Pl. XXV, figs. 8, 9; Pl. XIII, a fig. 1.

Sthenolepis areolata CHAMBERLIN, 1919, p. 90.

Station D.5695; 534 fathoms; bottom temp., F. 38.9°.

Aphroditidæ

Aphrodita defendens Chamberlin

Aphrodita defendens CHAMBERLIN, 1919, pp. 80-81.

Station D.5699; 659 fathoms; bottom temp., F. 37.9°.

Station D.5676; 645 fathoms; bottom temp., F. 39.0°.

Lætmonice pellucida Moore

Lætmonice ["*Lætmatonice*"] *pellucida* MOORE, 1903, p. 420, Pl. XXIII, figs. 19, 20.

Two specimens, which I have assigned to this species because of their general resemblance to Moore's description. Lack of agreement is shown in the subapical barbs of the arrow-pointed setæ, which are symmetrical instead of unequal in number on different sides of the shaft, and I could find no papillæ on the anterior ventral surface.

Station D.5695; 534 fathoms; bottom temp., F. 38.9°.

Nephtydidæ

Nephtys ectopa Chamberlin

Nephtys ["*Nephtys*"] *ectopa* CHAMBERLIN, 1919, pp. 94-97, Pl. XV, figs. 1-7.

Probably of this species, but too poorly preserved to allow of positive identification.

Station D.5698; 475 fathoms, bottom temp., F. 39.9°.

Nereidæ***Nereis mediator* Chamberlin**

Nereis mediator CHAMBERLIN, 1919a, page 11.

One specimen. Labeled as from Lower California.

***Platynereis integer* Treadwell**

Nereis (Platynereis) integer TREADWELL, 1920, p. 595, figs. 1-4.

One specimen. Labeled as from Lower California.

***Nereis kobiensis* McIntosh**

Nereis (Platynereis) kobiensis MCINTOSH, 1885, pp. 210-212, Pl. xxxiv, figs. 3, 4, 5, 6; Pl. xvii, figs. 2, 3, 4.

One specimen. Labeled as from Lower California.

Leodiciidæ***Leodice segregata* Chamberlin**

Leodice segregata CHAMBERLIN, 1919, p. 237-240, Pl. liv, figs. 1-5.

Station D.5695; 534 fathoms; bottom temp., F. 38.9°.

Station D.5682; 491 fathoms; bottom temp., F. 40.8°.

***Onuphis litabbranchia* Chamberlin**

Onuphis litabbranchia CHAMBERLIN, 1919, pp. 274-279, Pl. l, fig. 7; Pl. li, figs. 1-10; Pl. lii, fig. 1.

Chamberlin described the ceratophores as smooth. In the single incomplete specimen of this collection these are ringed. Each of the median and the outer paired ceratophores has seven rings, while each of the inner paired ones has twelve or thirteen. The gill structure agrees more closely with Chamberlin's paratype than with his type, for many are branched. The specimen is a female with eggs.

Station D.5673; 1090 fathoms.

***Onuphis lepta* Chamberlin**

Onuphis lepta CHAMBERLIN, 1919, pp. 290-295, Pl. xlv, figs. 1-7; Pl. xlvi, figs. 3-12.

A small and evidently immature specimen living in a mud tube attached to the outer wall of a *Hyalinæcia* tube was collected at Station D.5691. At Station D.5684 were collected a considerable number of these tubes, most of which were empty but one contained the anterior end of an individual which agrees in all respects with Chamberlin's description.

Station D.5684; 1760 fathoms.

Station D.5691; 868 fathoms; bottom temp., F. 37.2°.

Station D.5692; 1076 fathoms; bottom temp., F. 37.1°.

***Onuphis vexillaria* Moore**

Onuphis vexillaria MOORE, 1911, pp. 266-269, Pl. xvii, figs. 69-76.

These agree with Moore's description in every respect except that the frontal tentacles are closer together and in no somite are there more than four gill filaments. Four specimens.

Station D.5690; 1101 fathoms; bottom temp., F. 38.1°.

***Onuphis iridescens* (Johnson)**

Northia iridescens JOHNSON, 1901, p. 408, Pl. viii, figs. 86, 87; Pl. ix, figs. 88-92.

Nothria iridescens MOORE, 1911, p. 255.

Station D.5698; 475 fathoms, bottom temp., F. 39.9°.

***Onuphis hiatidentata* (Moore)**

Nothria hiatidentata MOORE, 1911, pp. 259-262, Pls. xvi and xvii, figs. 41-50.

In his description of this species Moore comments on the resemblance which it bears to *Hyalinæcia tubicola*, with which it is commonly associated. I have already mentioned the relations of the two in the matter of tube construction. See above, p. 2.

Station D.5673; 1090 fathoms.

Station D.5686; 930 fathoms; bottom temp., F. 37.3°.

Station D.5689; 879 fathoms.

Station D.5692; 1076 fathoms; bottom temp., F. 37.1°.

Station D.5691; 868 fathoms; bottom temp., F. 37.2°.

Station D.5690; 1101 fathoms; bottom temp., F. 38.1°.

Station D.5697; 485 fathoms; bottom temp., F. 39.8°.

***Hyalinæcia tubicola* (Müller) Malmgren subspecies *stricta* Moore**

Hyalinæcia tubicola (Müller) MALMGREN subspecies *stricta* Moore, 1911, p. 280, Pl. xviii, figs. 96, 97.

Station D.5673; 1090 fathoms.

Station D.5683; 630 fathoms; bottom temp., F. 39.1°.

Station D.5686; 930 fathoms; bottom temp., F. 37.3°.

Station D.5687; 480 fathoms; bottom temp., F. 41.1°.

Station D.5690; 1101 fathoms; bottom temp., F. 38.1°.

Station D.5691; 868 fathoms; bottom temp., F. 37.2°.

Station D.5692; 1076 fathoms; bottom temp., F. 37.1°.

Lumbrinereis bifilaris Ehlers

Lumbriconereis bifilaris EHLERS, 1901, pp. 139-144, Pl. xviii, figs. 1-10.

Lumbrinereis bifilaris MOORE, 1911, pp. 291-294, Pl. xx, figs. 135-142.

Station D.5694; 640 fathoms.

Cirratulidæ

A fragment of a cirratulid of indeterminable species was collected at Station D.5694; 640 fathoms.

Maldanidæ**Maldane similis Moore**

Maldane similis MOORE, 1906, pp. 233-236, Pl. xi, figs. 26-30.

The only deviation from Moore's description which these show is that on the lateral margins of the cephalic plate the lobes are more definitely toothed.

Station D.5683; 630 fathoms; bottom temp., F. 39.1°.

Maldane cristata, new species

Figures 5 to 8

Distinguished by the prominence of the cephalic crest and the smooth margins of the cephalic and anal plates. The type is 130 mm. long and has a cephalic width of 2.5 mm. It is entire, though the median region is very poorly preserved.

The prostomium makes an angle of about 45° with the body axis (Figs. 5 and 6). The cephalic plate is roughly triangular in outline, and is surrounded by a definite raised margin, which, possibly as a result of the preservation, is thrown into folds but shows no trace of lobings or denticulations. On either side at the postero-lateral angle is a notch separating the margin into a basal and two lateral lobes. The basal lobe is the more prominent and is bent caudad near its middle. The lateral lobes decrease in height anteriorly and are separated by a constriction from the hemispherical palpode. The crest is narrow, elevated and prominent, extending from the posterior margin of the cephalic plate into the base of the palpode (Fig. 6). Numerous fine grooves extend outward from the side of the ridge at an angle of 45 degrees, but these may be due to shrinkage after preservation. The mouth is a narrow elongated slit with no prominent lips.

The first two setigerous somites have thick body-walls; on succeeding somites the dorsal wall becomes thinner while the ventral wall remains thick; on the seventh setigerous somite only a small portion of the ventral wall is thick, while in the following somites the thickening is restricted to the line of insertion of the setæ. In the type there is not much difference between the preanal somites and those in the middle of the body, but in another specimen the five somites in front of the pygidium are short and thick-walled, while those through the middle of the body are long and thin-walled. These variations are doubtless due to differences in the degree of contraction.

The anal plate is circular in outline (Fig. 7). On either side is a rounded notch, whose ventral margin lies at the equator of the circle, thus dividing the circle into a dorsal and ventral portion, the ventral being the larger. The margin of the dorsal part is smooth, that of the ventral part is six- to eight-lobed. The anus is situated

dorsally near the margin of the plate, and has a dorsal and ventral lip, the latter the larger and with radiating lines.

Uncini (Fig. 8) appear on the second setigerous somite, only slender setæ appearing on the first. The rows of uncini are at first short but soon lengthen. Each uncinus has a long, gently curved shaft, of which I have figured only the terminal portion. At the apex is a single tooth with a much larger one ventral to it. Dorsal to the apical tooth are a series of fine denticulations, hardly large enough to be called teeth, which extend laterally around the end of the uncinus. Ventral to the larger tooth are a series of fine hair-like processes. In the tuft dorsal to the uncinus-row are two kinds of setæ. One has rather heavy brown-colored bases, which are bilimbate just outside the body wall but distally to this narrow into an extremely long delicate white apical portion with two marginal rows of minute denticulations. The second kind are smaller and not so dark in color as the first; they widen slightly toward the end and narrow abruptly asymmetrically to form a long, slender, needle-like apex which forms an angle with the main axis of the seta.

Station D.5698; 475 fathoms; bottom temp., F. 39.9°.

Terebellidæ

Terebella robusta (Johnson)

Amphitrite robusta JOHNSON, 1901, pp. 425-426, Pl. xvi, figs. 164-168.

Station D.5698; 475 fathoms; bottom temp., F. 39.9°. One specimen.

Thelepus crispus Johnson

Thelepus crispus JOHNSON, 1901, p. 428, Pl. xvii, figs. 175-178b.

One imperfectly preserved and evidently immature individual. In form of gills, setæ, and uncini this agrees with Johnson's description, but it does not show the eye spots which Moore describes in the young individuals.

Station D.5693; 451 fathoms.

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A PRELIMINARY REPORT ON THE HEMIPTERA-HETEROPTERA OF PORTO RICO COLLECTED BY THE AMERICAN MUSEUM OF NATURAL HISTORY

By H. G. BARBER

During the years of 1914 and 1915 The American Museum of Natural History, in conjunction with the New York Academy of Science and the Insular Government of Porto Rico, making a survey of the natural resources of the island, sent several entomologists to collect insects and to gather all the data possible concerning this particular fauna. This report may be considered a preliminary report upon the Hemiptera-Heteroptera gathered together during these several expeditions to the Island. The types are in the American Museum.

Catorhintha borinquensis, new species

Sordid yellowish gray closely punctate with ferrugineous. Lateral margins and middle longitudinal line of the pronotum, apex of the scutellum and three obscure stripes posteriorly on the head pale yellowish-gray; connexivum alternated with ferrugineous and pale yellow; abdomen dorsally fuscous with a large, indefinite pale area in the center; beneath stramineous, punctate on head, pleura and sides of venter with ferrugineous, with a round black spot on the sides of each pleurite; legs pale, tinted with rufous.

Head above the base of each antenna provided with a very sharp spine; dorsal surface of head coarsely and somewhat closely punctate with ferrugineous, with a median pale fascia extending from base to the middle and a shorter fascia extending forward from the base between each ocellus and the eye; ocelli red surrounded by a smooth black patch. Antennæ with the first segment shorter than the head, second segment a trifle longer than the third, fourth segment one-third longer than the third, basal segment finely granulate, ferrugineous, second and third segments pale, rufous at their apices, apical segment pale at base and apex. Apex of the rostrum reaching to the middle of the intermediate coxæ or just a trifle beyond the meso-metasternal suture. Pronotum rather coarsely punctate with ferrugineous, with a conspicuous longitudinal median stripe and lateral margins pale. Scutellum closely punctate, the apex smooth and pale, towards the basal angle stinted with red. Corium coarsely punctate, without the usual calloused pale spot opposite the apex of the commissure. Connexival segments pale at base, mottled with ferrugineous apically. Length, 10-11 mm.

TYPE.—Male; Coamo Springs, VI 1915. Eleven paratypes.

Related to *C. guttula* Fabricius but a little larger and more coarsely punctate and more ferrugineous. The spines of the head are quite long

and very acute. The rufous coloration of the antennæ, legs and ventral parts is often quite pronounced.

***Jadera rubrofusca*, new species**

Disk of pronotum and hemielytra rufofuscos, the latter narrowly pale and obscurely spotted with fuscous. Head entirely, broad lateral margins and median carina of pronotum, the scutellum, the abdomen above and below and in part the pleura bright red. Antennæ, rostrum, and legs fuscous. Membrane pale fuliginous, obsoletely spotted and often paler at base.

Head sanguineous, very sparsely granulate, almost smooth; ocelli set almost as far apart as the distance of each from the eye; second segment of the antenna a little longer than the third, fourth about as long as the second; rostrum reaching to the apex of the second abdominal segment. Pronotum sparsely set with setigerous granules, median carina very distinct. Scutellum red, impunctate. Hemielytra sparsely beset with setigerous granules, narrowly pale bordered and there spotted with fuscous. Pleurites obsoletely granulate, rufous, unspotted; anterior and posterior margins of propleuron, posterior margins of meso- and metapleuron and the acetabulæ shaded with fuscous. Venter red indistinctly granulate. Length, 11 mm.

TYPE.—Male; Aibonito, VI 1915. Twenty-two paratypes; Cayey, V; Aibonito, VI; Manati, VI; Adjuntas, VI; Ensenada, VI 1915.

Closely related to *sanguinolenta* but a little smaller and narrower than that species. Besides the color differences noted, the head is anteriorly more acuminate, the ocelli placed closer together and the head and pronotum much more sparsely beset with setigerous granules; the red border on the lateral margin of the pronotum is wider and the pleurites are not spotted with fuscous; the membrane is darker and obsoletely spotted.

***Lygæus albonotatus*, new species**

Black, sparsely grayish tomentose, with a large triangular orange area at base and the outer apical margin of corium white; membrane black, with an elongate white patch along the outer margin. Beneath black, with the bucculæ, anterior margin of the prosternum, the acetabulæ narrowly, pale; outer angle of the metapleuron orange; odoriferous orifices black.

Head entirely black impunctate, slightly transverse, margin before eyes almost straight; antenniferous tubercles invisible from above; antennæ black, basal segment about one-half as long as second, this a trifle longer than third, fourth a little longer than the second; bucculæ very slightly elevated, the lower edges level, not quite reaching the base of the head; apex of the rostrum reaching to middle of the posterior coxæ. Pronotum entirely black, almost impunctate, very shallowly impressed before the middle; each cicatrix forming a narrow, shining, crescentic impression which reaches nearly to the lateral margin; lateral margins very slightly concavely arcuated about the middle. Scutellum entirely black, impunctate; longi-

tudinal carina behind the premedian transverse carina broad and not sharply delimited. Clavus black, impunctate. Corium impunctate with the lateral margin lightly rounded, the two margins converging posteriorly; apex of the corium not reaching the middle point of the membrane; the two discal veins much more evident on the ochraceous area, this ochraceous area extending nearly to the middle of the corium; the outer two-thirds of the apical margin occupied by a conspicuous whitish or pale yellow fascia. Membrane jet black, extending a little beyond the apex of the abdomen; veins very obscure, with a very conspicuous elongate, oval white patch midway along the outer margin, not pale margined posteriorly. Beneath with a few obsolete punctures anteriorly on the prosternum; posterior margin of the metapleuron strongly, sinuate in the middle. Venter entirely black, with short pile. Length, $3\frac{1}{2}$ mm.

Described from a single male from Mona Island, II 1914.

This is one of the smallest members of the genus, even smaller than *dallasii*, which I place in the subgenus *Melanocoryphus* because of the lack of a red or pale spot on the vertex of the head. I cannot find that it is related to any other described member of the genus.

***Lygæus* (?*Melanostethus*) *coccineus*, new species**

Black, very sparsely grayish tomentose; middle area of corium, abdomen above and below except posteriorly, coccineous; membrane dilute lacteus with a fuscous spot on the basal middle; head with a red spot on the vertex; anterior lateral angles of the second to fifth and the sixth segment above and below black.

Head impunctate, about as long as wide, apex reaching to the middle of basal segment of the antennæ; antenniferous tubercles visible from above; lateral margins of the head not sinuate before the position of the antenniferous tubercles; vertex of the head with a dark red spot; antennæ black, second segment about four times as long as first, third segment two-thirds as long as the second, fourth segment about as long as the second; bucculæ short very little elevated, reaching to the middle line of the eyes. Rostrum black, apex reaching to posterior margin of second abdominal segment, second and third segments subequal. Pronotum black, obsoletely punctate, behind the middle with a transverse, obtuse ridge which does not reach the lateral margins on each side; running anteriorly forward from this is a short obscure, obtuse, median ridge which does not reach the anterior margin, surface shallowly depressed either side of this and more deeply depressed behind the transverse ridge; lateral margin of the pronotum almost straight; cicatrices narrow, oblique, separated at their inner extremities by the short longitudinal ridge. Scutellum black, with the usual transverse subbasal ridge and apical carina. Clavus black, this gradually widening posteriorly, finely wrinkled. Central disk of the corium coccineous or dark carmine red, inner claval margin narrowly and broad lateral margin expanded posteriorly, black, narrow apical margin also red; whole surface finely wrinkled; the two longitudinal veins strongly elevated; costal region distinctly rounded beyond the middle, apex reaching to posterior margin of the fourth abdominal segment. Membrane dilute lacteous, veins concolorous, with a fuscous spot on the basal middle; not reaching apex of the abdomen. Abdomen coccineous, narrow edge of connexivum and sixth segment, black. Head, sternum and legs black. Venter

coccineous with anterior lateral margins of segments two to five, disk posteriorly and all of sixth segment, black. Length, $6\frac{1}{2}$ -8 mm.

Described from two males and three females from San Juan, II 1914.

This does not fall into any of the recognized subgenera occurring in the Western Hemisphere but apparently should be placed in *Melanostethus* erected by Stal to include *L. marginatus* Thunberg from the Cape of Good Hope. In fact, this species answers very well to Stal's short characterization of Thunberg's species, but it seems to me unlikely that the species could have been introduced into the West Indies.

***Pachygrontha parvula*, new species**

Head longer than wide with an obscure pale streak in the middle towards base and a small pale spot without each ocellus; rather closely and coarsely punctate; tylus projecting well beyond jugæ; antenniferous tubercles outwardly acute. Antennæ with the first three segments pale, fourth segment missing; basal segment rather strongly clavate towards apex only, a little shorter than second and third taken together, second segment one-third longer than third; ventral surface broadly ferrugineous. Pronotum only a little longer than wide, much less than half the length of the corium, evenly and coarsely punctate with ferrugineous with a conspicuous caloused median longitudinal line continuous throughout; a smooth ferrugineous area either side of this on the central disk; just within the humeral angles provided with a smooth ferrugineous knob-like elevation; the lateral margins not straight but strongly concavely arcuate behind the middle, the edge pale, rather sharply carinate and narrowly subreflexed. Scutellum with a conspicuous median elevated ridge, continuous with central carina of the pronotum; elsewhere ferrugineous, coarsely punctate. Clavus with two distinct rows and apically with an incomplete row of close-set strong punctures. Corium pale stramineous, sparingly punctate with ferrugineous in three series between the veins; middle of apical margin and apex of the corium with a dark castaneous spot, the latter less conspicuous. Membrane with an obscure infuscated median streak. Beneath, pale ferrugineous, tomentose, propleuron and edge of the venter somewhat paler. Legs pale sordid yellow, speckled with ferrugineous, the incrassate fore femora ferrugineous beneath, armed with four stout black-tipped teeth between each of which is a shorter tooth. Length, $4\frac{1}{2}$ mm.

Described from a single male from Mona Island, II 1914.

Somewhat related to *P. bimaculata* Distant but, besides being smaller with different markings, the antennal segments differ in relative length, etc.

***Orthæa ferruginosa*, new species**

Ferrugineous; head, anterior lobe of pronotum and scutellum dark castaneous; posterior lobe of pronotum and hemielytra pale ochraceous, punctate and maculate with ferrugineous; antennæ, legs and rostrum stramineous, banded with ferrugineous or fuscous as hereafter described; beneath castaneous.

Head a trifle longer and scarcely narrower than the anterior lobe of the pronotum, dark castaneous, apex of tylus reddish; coated with fine golden hairs; abruptly con-

tracted just behind eyes; apex extending to just beyond the middle of the basal segment of the antennæ; ocelli red. Antennæ stramineous, apex of 1st, 2nd, 3rd, and all of 4th fusco-ferrugineous; 2nd segment one-third longer than basal, 3rd segment about one-third shorter than 2nd, 4th a little shorter than 2nd. Head beneath castaneous, finely punctate. Rostrum stramineous, basal segment about one-third longer than basal segment of antenna; apex extending to end of intermediate coxæ. Pronotum strongly constricted behind the middle, anterior lobe castaneous, considerably narrower than and not quite twice as long as the posterior lobe, finely and sparsely punctate and provided with a few long pale hairs; posterior lobe ferrugineous, more closely punctate, with a smooth ochraceous spot either side of the middle and another more narrow, elongate one on the humeral tubercles. Scutellum uniformly castaneous, rather coarsely punctate along the sides, with an abbreviated premedian transverse, smooth ridge followed by a median longitudinal, smooth carina which reaches the concolorous apex. Hemielytra ochraceous, sparingly punctate with ferrugineous and marked with three rather obscure fascia as follows: a small round subbasal spot, a broad post-median costal fascia fading out inwardly and a triangular apical fascia; with an irregular smooth pale area close to and opposite to the apex of commissure; another small pale area on the costal margin just before the apical fascia; costal margins lightly convexly arcuate before the middle. Membrane fuscous, irrorate, with sordid ochraceous, veins for the most part and a small triangular spot at apex pale. Sternum and venter castaneous, the posterior margin of the metapleuron paler ferrugineous. Venter finely pilose. Legs stramineous with basal half of inerassate fore femur pale castaneous; second and third femora with a narrow preapical ring and apices of all tibiæ and tarsi narrowly, fuscous. Inerassate fore femur armed along the outer two-thirds with several strong teeth interspersed with a few smaller ones. Anterior tibia slightly curved. Length, $4\frac{1}{2}$ mm.

TYPE.—Male; Mayaguez, VII 1914. Paratypes: two females, Maricao, VII 1914; one female, Adjuntas, VI 1915; and two females, San Lorenzo, Santo Domingo, VI 1915.

Very closely related to *servillei* Guerin but, besides being smaller, the legs are differently colored and marked and the terminal segment of the antenna is entirely fuscous.

***Euryophthalmus obovatus*, new species**

Narrowly obovate, widest across apex of commissure. Finely pilose. Color piceous-black, extreme base of antennæ, bucculæ, narrow anterior margin and posterior third of pronotum, clavus in part, corium except inner apical part, connexivum, lateral margins of the venter, trochanters, femora and extreme base of tibia, bright red. Membrane pale, black at base.

Head subshining black, with very sparse covering of golden-yellow hairs and fine black pile; impunctate, finely transversely rugulose; eyes strongly projecting; beneath except for bucculæ shining black, with fine sparsely scattered silvery hairs. Rostrum black with the first three segments almost equal, the fourth about two-thirds as long as the third. Antennæ black with extreme apex of antenniferous tubercles and base of first segment reddish; terminal segment subequal in length to the basal one. Pronotum shining black, a little wider than long, provided with fine black hairs;

anterior margin very narrowly red followed by a coarsely punctate sunken area; transverse anterior lobe smooth, shining with a transverse sunken pit-like depression placed nearer to the lateral than the median line; posterior lobe lightly depressed anteriorly, a little longer than the anterior one, set off anteriorly by a series of rather close-set coarse punctures followed by scattered coarse punctures, which are black anteriorly on the smooth, broad, red fascia which occupies more than half of the posterior lobe and extending between the two humeral margins; lateral margins very slightly arcuated near the middle. Scutellum black, sparsely but distinctly punctate, without fine coating of decumbent hairs; plainly wider than long. Hemelytra red with clavus coarsely and closely punctate and smudged with black inwardly. Corium red, sparsely punctate with black between the median vein and claval suture; with a single row of regular punctures along the claval suture; inner area posterior to middle smudged with black; costal margins strongly rounded, widest across apex of the commissure, from whence more strongly converging. Membrane sordid lactose, broadly black at base, apex not reaching end of the abdomen, extending a trifle upon the base of the sixth segment. Tergum black; entire connexivum above and below to just beyond the line of the spiracles, red. Below with the sternum and venter shining black with sparse and scattered coating of fine silvery-white hairs and fine black pile. Propleura posteriorly coarsely punctate. Trochanters, femora and extreme base of the tibia red, remainder black; anterior femora only, armed with two or three small spines. Length, 11–12 mm. Width across corium, 5 mm.

TYPE.—Male; San Lorenzo, Santo Domingo. Paratypes: female, Udnato, Porto Rico; three males and six females, San Lorenzo, Santo Domingo.

***Atheas pallidus*, new species**

Whitish; head pale ferrugineous, pronotum anteriorly on either side of median carina and the disk exclusive of triangular posterior part, sternum and venter pale ferrugineous; discoidal area of hemelytra apically and post-median spot of the membrane obscurely embrowned; legs stramineous.

Head without evident projecting spines; antenniferous tubercles blunt not at all prominent, the lateral spines depressed, reduced to a pale ruga running along the inner margin of the eyes; space between these smooth, pale ferrugineous. Antennæ long and slender, lightly embrowned, apical segment fuscous except at extreme base, apical part of third paler; slightly incrassate, cylindrical basal segment twice as long as the second which is constricted at base and twice as long as wide; third segment very long, not incrassate at base or apex, over three times as long as first and second taken together; apical segment finely hairy almost as long as first and second taken together, slender at base gradually widening to one-fourth way from apex thence more abruptly tapering. Anterior margin of pronotum twice sinuate, in the middle forming a very obtuse angle; paranota pale hyaline rather widely reflexed and furnished with a single row of 10 to 11 areolæ, the outer margin straight between the anterior and posterior abruptly rounded terminations; anterior part of pronotum somewhat elevated, pale hyaline, distinctly areolate, more strongly elevated and compressed at the anterior termination of the median carina, posteriorly to this on either side of median carina with a transverse, smooth, pale ferrugineous depression; pale lateral carina slender but distinct, running back from the center of this depression; pale median carina, slender but very distinctly elevated, continuous from base to

apex; rounded disk between these carina smooth pale ferrugineous and pruinose; the triangular prolongation rather acute, distinctly areolate. Hemelytra narrow elongate, semicircularly rounded behind, the outer margins almost parallel, very gently rounded, lightly contracted opposite the middle of the membrane; costal margin with two distinct regular rows of subquadrate areoles to just beyond the middle of membrane, thence furnished with a single row posteriorly; subcostal area with a single row of areolæ on the basal half, apically with two rows; discoidal area extending to just beyond the middle of hemelytra, about four times as long as wide, the areoles very evident, about the size and character of those of the posterior prolongation of the pronotum, posteriorly embrowned. Membrane reaching far beyond the apex of the abdomen, provided with numerous distinct areoles, these gradually enlarging in size towards apex, a little behind middle with an obscure embrowned area. Beneath, sternum and venter pale ferrugineous, pruinose; sternal laminae of the rostral groove white, contiguous on the mesosternum. Coxæ and remainder of the legs stramineous, extreme apices of the tibiæ and tarsi infuscated. Wings fuliginous, apices visible below, reaching past middle point of exposed part of membrane. Length, 3 mm; width, $\frac{3}{4}$ mm.

Described from several examples from Arecibo, VII 1914.

This is not related to any other described species of *Atheas*. The pallid aspect, absence of spines of head, long antennæ with contiguous basal segments, contiguous mesosternal rostral laminae are some of its most evident characters.

***Ploiariodes barberi*, new species**

W. L. McATEE AND J. R. MALLOCH¹

MALE.—Head with white pruinosity in front of eyes and a white line from base of each antenna, which connects with another that runs diagonally from lower hind margin of eye to upper occiput; faint lines of pruinosity on lower sides of pronotum in front and on pleura, and posterior and lateral margins, and lateral and dorsal carinae of pronotum white. Abdominal spiracles white; venter mottled, each sternite with a large round bare spot on each side on hind margin. Antennæ and legs with narrow annulations, a subapical one on each femur and on first segment of antenna broader. Dark areas on fore wings profusely areolate with minute pale dots; apices of hind wings fuscous with white reticulations.

Pronotum without median tubercle on hind margin; submedian dorsal carinae as sharp as the lateral ones, but little curved; mesonotal and metanotal thorns absent in type, the one at base of abdomen distinct. Apical abdominal sternite not deeply excavated at tip. Fore femur with very weak ventral spinules. Stigma normal, cross-vein closing apex of discal cell on its anterior half straight, the other one curved. Length (without wings), 3 mm.

HOLOTYPE.—Tallaboa, near Ponce, Porto Rico, July 23, 1914, H. G. Barber.

Named in honor of the collector. This is one of the most distinct species known to us. The submedian dorsal pronotal carinae are not

¹This description was kindly drawn up by Messrs. McAtee and Malloch; the species should be credited to them.

sharp in any other species, and the only other which has the dark areas of the fore wings with minute hyaline dots is *P. parshleyi* Bergroth.¹

GORPIS Stal

This genus, established in 1859 by Stal for *cribraticollis* from Ceylon, has a rather wide distribution through the Ethiopian, Oriental and Australian faunal realms but has not hitherto been reported from either the Neotropical or Nearctic realms. Reuter in the *Annales Soc. Entomol. de Belgique*, LIII, 1909, pp. 423-430, gives an extended characterization of the genus *Gorpis* and treats of the seven known species.

Gorpis neotropicalis, new species

Sordid yellow-white; antennæ, dorsum of head in part, scutellum posteriorly, streak on clavus posteriorly and also along inner and apical margin of corium, rostrum, apices of all femora, base and apex of all tibiæ, dilute red.

Head smooth, shining, plainly pilose below and with a few scattered long hairs above; space between the eyes subequal to that of diameter of eye itself; ocelli not discernible, sides of tylus longitudinal streak on the vertex and a V-shaped fascia running back from the center of the eyes to base, dilute red. Antennæ finely pilose, irrorate with red on the two basal segments, basal segment about as long as head and the anterior lobe of the pronotum taken together, apex slightly incrassate, two-thirds as long as second; third segment one-third shorter than first; fourth segment over one-half, nearly two-thirds as long as third segment. Rostrum finely pilose, with short, thick basal segment, second segment one-third longer than third, fourth less than one-half the length of third. Pronotum dull, non-pilose, obtusely constricted behind middle, with the anterior lobe exclusive of collar a trifle longer than posterior lobe; disk of both lobes impunctate, with a few coarse punctures along the sides posterior to the transverse stricture; anterior lobe with a faint median suleus; humeral angles unarmed, provided with an elongated rounded prominence; posterior margin evenly arcuated, not straight before the base of scutellum. Scutellum impunctate, slender, transversely depressed before the middle; disk behind this somewhat swollen, dilute red; apex depressed, very acute. Hemelytra dull, obsoletely wrinkled; clavus posteriorly dilute reddish; corium with costal margin from close to base narrowly expanded; inwardly streaked with dilute red close to and along apical half of clavus extending to beyond base of membrane, another similar streak along the inner margin of corium next to the membrane which does not quite reach the apex of corium; apex of corium reaching back as far as apex of the abdomen. Membrane pale, reaching well beyond apex of abdomen. Wings reaching apex of abdomen. Legs long and slender with long pile; fore femora slightly incrassate, almost straight, provided above with a few scattered long hairs and below densely clothed with numerous spinules interspersed with slender bristles and hairs; fore tibiæ curved at base, gently curved apically from middle, inwardly serrate, serrations tipped with downwardly curved setæ; towards apex rather abruptly expanded and armed inwardly with a

¹1922, *Notulae Entomologicae*, II, p. 70.

stout, curved spine or process extending beyond apex of tibia. Propleuron coarsely punctate; mesopleuron smooth, broadly whitish pruinose except along outer margin. Venter smooth, shining; genital segment of male finely pilose, provided on either side with an upwardly directed, curved and somewhat twisted acute genital hook, curving toward median line. Length, 12 mm.

TYPE.—Male; Aibonito, VII 1914. Paratypes: three males and three females, Aibonito, VII 1914 and one female, Adjuntas, VI 1915.

This species seems to be somewhat closely related to *cribraticollis* Stal, described from Ceylon. The disk of the pronotum is not closely punctate; the ocelli are not discernible; the anterior femora are scarcely curved and the posterior margin of the pronotum is evenly arcuate. In fact, some of the characters would seem to throw this out of the genus *Gorpiis* as characterized by Stal and Reuter and yet, as most of the characters agree, I hesitate to establish a new genus for it. The reddish maculations are subject to considerable variation and some specimens are almost entirely devoid of red.

***Hydrometra consimilis*, new species**

Color, similar to *H. martini*, brownish-fuscous with a pale median line on the pronotum; two basal segments of the antennæ, rostrum, and legs, brown. Head, with antecular part twice as long as the postocular, from a little before middle gradually widened to the base of the antenniferous tubercles; strongly impressed or sulcate between the eyes; postocular part gradually widening posteriorly, widest just before the pronotum, furnished with a seta on either side before a basal transverse pale fascia and with four setæ anteriorly on the antecular expanded part. Antenna with incrassate basal segment extending about one-fourth its length beyond apex of the head, second segment lightly incrassate at apex almost twice as long as basal, third segment long, over three times as long as second, fourth a little over twice as long as second, about one-third shorter than third; third and fourth segments fuscous. Rostrum brown reaching well beyond middle point of postocular part of head; middle region of head below pale brown. Pronotum dark brown more or less infuscated with a median longitudinal pale line, also bordered with a pale line along the lateral edge; posteriorly on either side with a somewhat elongate subtubercular prominence placed on a line above the posterior coxæ. Hemelytra dull lactose with fuscous nervures and with a brown streak running through almost the entire length of the corium; apex of membrane reaching the middle of fifth abdominal segment. Genital segment much as in *martini*, furnished dorsally with a prominent terminal spine which is not porrect but slightly inclined upwards. Beneath with sternum and venter in the central longitudinal region, pale brown; venter laterally fuscous, somewhat pruinose; close to base of sixth segment furnished on either side with a deflexed, short, broad flattened process, these set rather close together, and concave along their free edges. Legs deep brown, apex of hind femora about reaching end of the abdomen. Length, $9\frac{1}{2}$ mm.

TYPE.—Macropterous male, Coama Springs, VII 1914.

Closely related to *H. martini* Say but the anteocular part of the head is relatively longer and strongly impressed between the eyes; the relative lengths of the antennal segments is different, the spine of the genital segment is upwardly inclined and the flattened basal processes of the sixth abdominal are more evident, but perhaps retractile. Both *australis* Say and *naiades* Kirkaldy are closely allied species, but neither is the head nor the second segment of the antenna more dilated apically than in *martini*. The relative lengths of the antennal segments as well as the size precludes the possibility of this being Kirkaldy's species. *H. caraiba* Guérin is a much larger species with rostrum not extending beyond the eyes.

***Plea punctifer*, new species**

Pale yellowish-gray; closely and rather coarsely punctate, the punctures on the posterior part of the corium brown; apex of the head and rostrum fuscous; middle stripe on the vertex in front and the scutellum more pale testaceous yellow; inner line of clavus next to scutellum and claval suture narrowly but lightly infuscated. Claval suture distinct.

Head with closely and evenly set clean-cut punctures except on the median testaceous stripe, where they are more sparse; no indication of a median line or carina; width between the eyes about two and one-half times as great as its length, inner orbits of the eyes parallel from close to base. Pronotum somewhat shining, unicolorous, closely punctate, more coarsely so on the anterior half, posteriorly with punctures more shallow and larger, appearing rimmed but not reticulate, set with fine decumbent hairs; the lateral margins not at all parallel, very lightly concave before the somewhat more prominent humeral angles which protrude well beyond the line of eyes; posterior margin before base of scutellum straight. Scutellum a trifle wider than long, shining testaceous-yellow, coarsely punctate along the sides, more sparsely so on the disk; acuminate at apex and there finely, transversely rugulose. Hemelytra subshining with the claval suture very distinct; closely and coarsely punctate, the punctures posteriorly on the corium faintly brownish. Seen from the side, the dorsal outline is gently rounded from the posterior third of pronotum to a little beyond apex of commissure, whence it is abruptly declivous; posteriorly its plane is almost perpendicular; the greatest dorso-ventral diameter being about the middle point of the commissure. Sternum and venter fuscous. Legs pale testaceous-yellow, with the coxae, trochanters and base of the femora fuscous; anterior tarsus about one-half the length of the fore tibia, the two segments subequal; tarsal claws more than one-half the length of a tarsal segment; middle femur provided with close-set slender spines or bristles towards base; apex of middle trochanter armed with two short spines; hind tarsus including claws three-fourths as long as hind tibia. Length, $2\frac{1}{2}$ mm. Width, 1 mm.

TYPE AND SINGLE PARATYPE.—Arceibo, VII 1914.

This is considerably larger and relatively broader than *P. striola*, differently punctured, with the arch of the back less rounded and more

abruptly declivous behind. Unlike all specimens of *striola* which I have seen, the claval suture is very distinct. Mr. Roland F. Hussey has suggested to me that possibly this may be present in full-winged forms only. Professor Drake has kindly allowed me to examine a paratype of his *harnedi* from Mississippi, which is much more shining and strongly marked with fuscous with the punctures not so closely set especially on the corium, besides being relatively narrower. I have not been able to differentiate the sexes.

Plea puella, new species

Smaller than *P. striola*, somewhat shining. Color pale cinereous, on the corium rather closely punctate with fuscous, clouded with brown at apex of clavus and corium; pronotum posteriorly reticulate; head pale yellow-gray with a brown streak in the middle.

Head shining, finely and sparsely punctate along the sides, impunctate in the center of the disk; not quite twice as wide between the eyes as long; across the eyes plainly narrower than diameter of pronotum posteriorly. Pronotum with the anterior fifth smooth with a row of punctures along the anterior margin; this smooth area followed by a series of coarse punctures, posterior two-thirds reticulate; humeral margin projecting beyond line of eyes and somewhat elevated within. Scutellum shining testaceous-yellow, a little longer than wide, with scattered brown punctures. Clavus and corium furnished with rather close-set brown punctures, on the latter more closely set and shallower posteriorly, with a single row of coarse punctures along the costal edge; clouded with fuscous posteriorly on the clavus and corium. Viewed from the side with the dorsal outline from base of scutellum greatly flattened, very lightly arcuated and subparallel to costal margin, abruptly declivous from a little behind apex of commissure. Sternum and venter fuscous. Legs testaceous-yellow; coxæ fuscous. Length, $1\frac{1}{2}$ mm. Width, $\frac{3}{4}$ mm.

TYPE AND TWENTY-NINE PARATYPES.—Arecibo, VII 1914. One paratype: Guadeloupe.

This species is considerably smaller than the preceding and about three-fourths the size of *striola*. From the latter it may be distinguished by differences in coloration and punctuation with relatively longer scutellum and less rounded dorsally. As suggested by Kirkaldy in 1904, Champion's *striola* is very probably distinct from that species.

GENERAL LIST

In addition to the above, the following species were found in Porto Rico. The detailed distribution of these species, together with notes concerning them, will be given in the full report.

SCUTELLERIDÆ

Pachycoris fabricii Linnæus
Diolcus boscii Fabricius
Augocoris serpuncatus Fabricius

CYDNIDÆ

Corimelæna (Eucoria) minuta Uhler
Æthus indentatus Uhler
Amnestus subferrugineus Westwood
Amnestus pusio Stal

PENTATOMIDÆ

Mormidea angustata Stal
Mormidea sordidula Stal
Solubea pugnax Fabricius
Euschistus crenator Fabricius
Proxys victor Fabricius
Thyanta perditor Fabricius
Thyanta casta Stal
Thyanta antiquensis Westwood
Loxa flavicollis Drury
Fecelia minor Vollenhoven
Nezara viridula Linnæus
Acrosternum marginatum Palisot de
 Beauvois
Piezodorus guildingi Westwood
Piezodorus tinctus Distant
Arvelius albopunctatus DeGeer
Edessa species
Edessa bifida Say
Alcæorrhynchus phymatophora Palisot
 de Beauvois
Podisus sagitta Fabricius
Piezosternum subulatum Thunberg

COREIDÆ

Leptoglossus balteatus Linnæus
Leptoglossus stigma Herbst
Leptoglossus gonagra Fabricius
Phthia picta Drury
Phthia lunata Fabricius
Coreocoris fusca Thunberg
Coreocoris batulus Fabricius
Charisterus gracilicornis Stal
Margus obscurator Fabricius
Catorhintha guttula Fabricius
Anasa scabrotica Fabricius
Zucca tenuis Dallas
Sphictyrtus whitei Guerin

Leptocoris filiformis Fabricius
Hyalmenus longispinus Stal
Megalotomus rufipes Westwood
Harmosies serratus Fabricius
Exogenus extensus Distant
Corizus hyalinus Fabricius
Corizus sidæ Fabricius
Jadera sanguinolenta Fabricius

NEIDIDÆ

Jalysus spinosus Say

LYGÆIDÆ

Oncopeltus fasciatus Dallas
Oncopeltus aulicus Fabricius
Lygæus (Melanocoryphus) collaris
 Fabricius
Lygæus (Ochrostomus) pulchellus
 Fabricius
Ortholomus jamaicensis Dallas
 (= *Nysius providus* Uhler, in part)
Nysius ericæ Schilling
 (? = *Nysius scutellatus* Dallas)
Nysius basalis Dallas
 (? = *Nysius inæqualis* Uhler)
Cymoninus (Ninus) notabilis Distant
Ischnorhynchus championi Distant
Cymus virescens Fabricius
 (= *Cymus breviceps* Stal)
Blissus leucopterus Say
Geocoris lividipennis Stal
Ninyas deficiens Lethierry
 (= *Ninyas strabo* Distant)
Ligyrocoris abdominalis Guerin
Paromius longulus Dallas
Orthæa bilobata Say
Orthæa vineta Say
Plochiomera minima Guerin
Ozophora burmeisteri Guerin
Ozophora concava Distant

PYRRHOCORIDÆ

Dysdercus andrææ Linnæus
Dysdercus sanguinarius Stal
 (= *D. jamaicensis* Walker)

TINGIDÆ

Corythucha gossypii Fabricius
Corythaica moncha Stal

Corythaica carinata Uhler
Leptodictya bambusæ Drake
Teleonemia proluxa Stal

PHYMATIDÆ

Phymata marginata Fabricius
Macrocephalus crassimanus Fabricius
Macrocephalus leucographus Westwood
Macrocephalus pulchellus Westwood

REDUVIIDÆ

Ploiariodes rubromaculata Blackburn
Ploiariodes armata Champion
Ploiaria gundlachi Dohrn
Zelus longipes Linnæus
 (? = *Z. rubidus* Lepeletier and
 Serville)
Zelus subimpressus Stal
Heza pulchripes Stal

MESOVELIIDÆ

Mesovelgia mulsanti Buch. White

NABIDÆ

Pagasa fusca Stein
Nabis sordidus Reuter
Nabis signatus Uhler
Carthasis minor Reuter
 (? = *C. rufo-notatus* Champion)

ANTHOCORIDÆ

Piezostethus sordidus Reuter

Macrotracheliella lævis Champion
Triphleps insidiosus Say

GERRIDÆ

Gerris (Limnotrechus) cariniventris
 Champion
Tenagogonus (Limnogonus) guerini
 Lethierry and Severin
Rheumatobates imitator Uhler

VELIIDÆ

Microvelia pulchella Westwood
Microvelia capitata Guerin
Rhagovelia tayloriella Kirkaldy

SALDIDÆ

Saldula pallipes Fabricius
Micranthia humilis Say
Micranthia species

NOTONECTIDÆ

Notonecta undulata Say
Buenoa species

NAUCORIDÆ

Pelocoris femoratus Palisot de Beauvois

NEPIDÆ

Ranatra species

BELOSTOMATIDÆ

Lethocerus annulipes Herrich-Schæffer
Belostoma boscii Lepeletier and Serville



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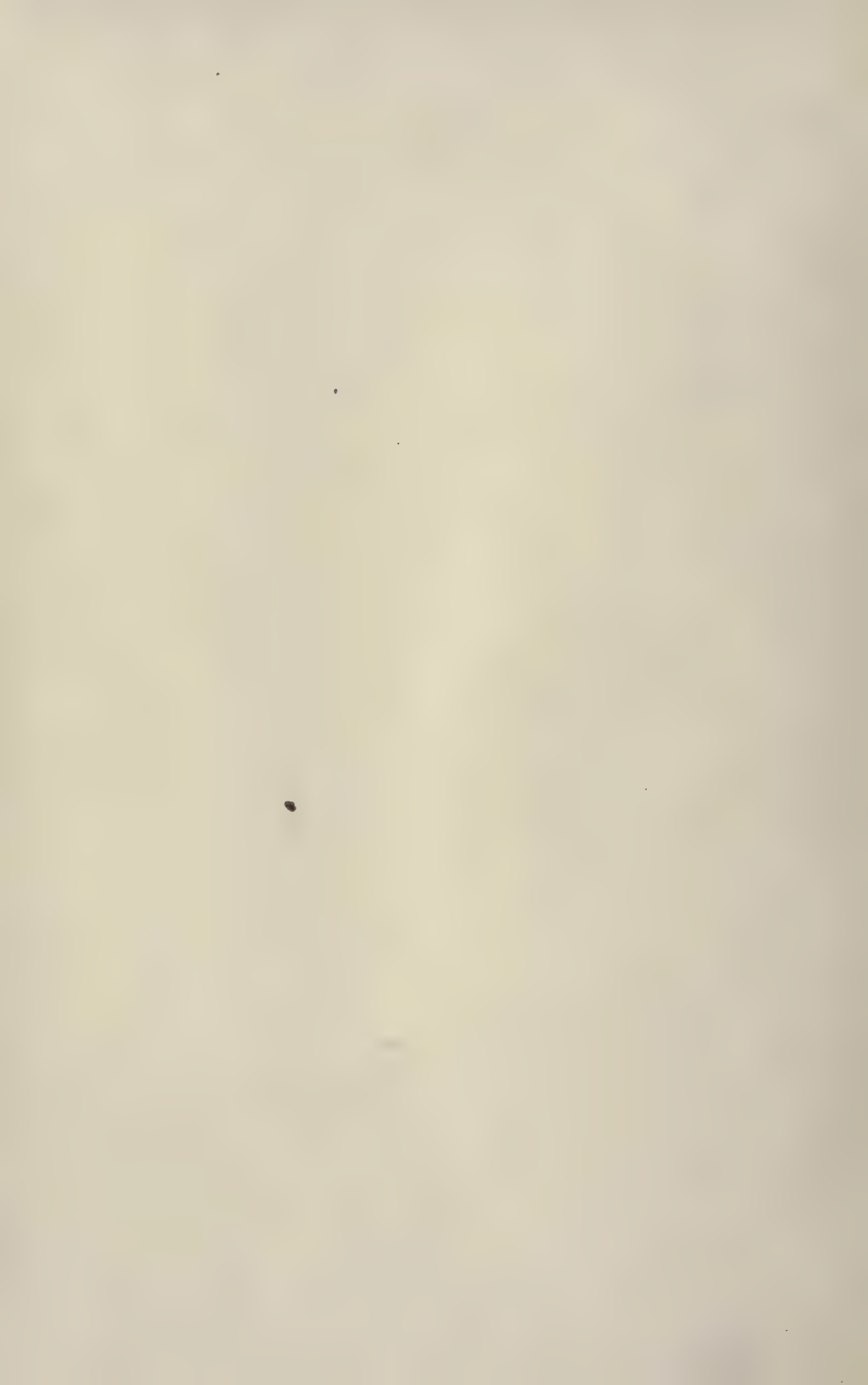
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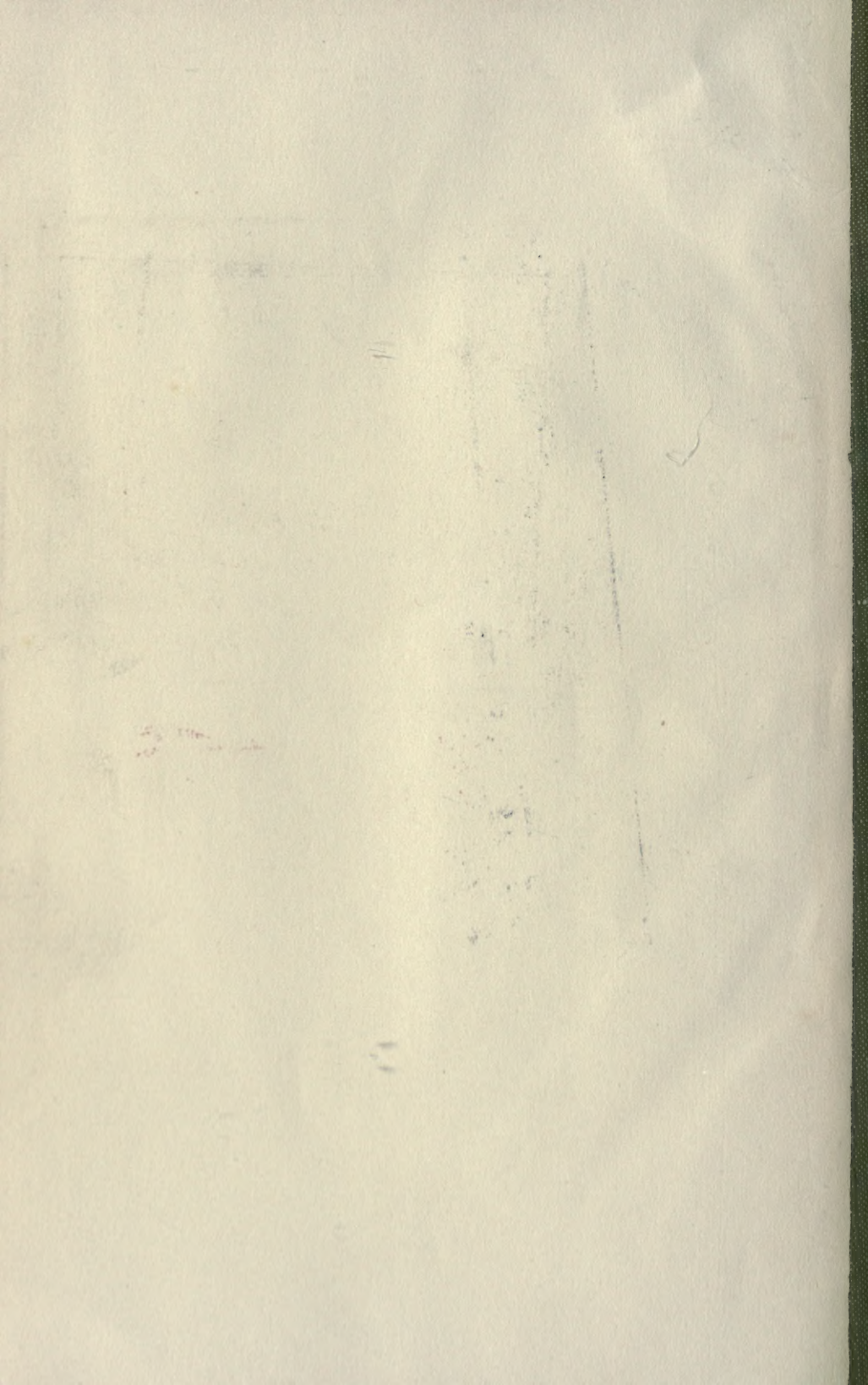
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- Xylocopa tranquebarica, **66**, 2.
- Zacryptocerus, **45**, 11.
- Zelus longipes, **75**, 13.
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- Zicca tæniola, **75**, 12.





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